The Geographical Journal

INCLUDING THE PROCEEDINGS OF THE ROYAL GEOGRAPHICAL SOCIETY

PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL.
EDITED BY THE SECRETARY.

VOL. XVIII.—JULY TO DECEMBER, 1901.

LONDON:
THE ROYAL GEOGRAPHICAL SOCIETY, 1, SAVILE ROW;
EDWARD STANFORD, 12, 13 AND 14, LONG ACRE, W.C.
1901.

JUL 21 1936

PRINTED BY
WILLIAM CLOWES AND SONS, LIMITED,
LONDON AND BECCLES.

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The
Geographical Journal.

No. 1. JULY, 1901. Vol. XVIII.

ADDRESS TO THE ROYAL GEOGRAPHICAL SOCIETY.*

By Sir CLEMENTS R. MARKHAM, K.C.B., F.R.S., President.

Towards the end of our geographical year, a deep shadow was cast upon our work by the death of our revered and beloved patron, Her Majesty Queen Victoria. We endeavoured to mark our heartfelt sense of the loss we sustained, in common with all our fellow-subjects, by setting apart an evening meeting to commemorate the good and great qualities of her for whose loss we mourn.

At the same time we paid our tribute of congratulation, on the accession of his present Majesty, King Edward VII. The King was the oldest permanent official of our Society, having been Vice-Patron from 1862 to 1901. It is now my privilege to announce that His Majesty has been graciously pleased to accept the office of Patron of the Society, and to intimate his intention to continue the royal premium which had been granted to the Society by his two predecessors, King William IV. and Queen Victoria. Looking back at our Sovereign's connection with the Society for such a long term of years, we may feel assured that His Majesty will continue to take the same interest in our labours for the advancement of geographical knowledge in the future, as he has done, when Prince of Wales, in the past. No less interest has been taken in the proceedings at our evening meetings by His Royal Highness the Duke of Cornwall and York, who has been graciously pleased to succeed his august father as Vice-Patron of the Society.

The geographical work which is engaging most attention at the present moment is that connected with the International Conference at Christiania, for the exploration of the ocean. It is not the first time

* Read at the Anniversary Meeting, May 20, 1901.

that this Congress has met, but the present meeting is probably the largest and most representative that has yet been held. The main purpose of the Conference is to deliberate on the best means of exploring the North Atlantic, the North Sea, and the Baltic. The primary object of the study of these seas is avowedly economic: to devise means for ascertaining whether the supply of fish is declining, as is generally believed; what is the reason for such decline if it is really a fact, and the best means of preventing or checking its progress. Russia, Germany, and Norway have built vessels specially for this purpose, and have appointed their ablest men of science to carry out the necessary researches. It is very sad to see our own country taking part in the Conference in a half-hearted way. We must still hope that England will not be behind such small States as Norway and Denmark in contributing to an investigation that will yield rich results to science, as well as for the benefit of an important industry. Not only should our fisheries profit from the results of this great international enterprise, but it is probable that data may be collected that will enable us to forecast the weather for a much longer period than is at present possible. There is now little doubt that oceanic conditions have a marked effect on the weather.

Our former able and zealous librarian, Dr. Mill, has left us, to take charge of the British rainfall organization. It cannot, I think, fail to be gratifying to the Fellows of the Society to know that our late accomplished librarian has been selected by His Majesty's Government as one of the specialists to represent this country at the Christiania International Conference for the exploration of the ocean. Dr. Mill's services to geography in the past are well known, and I sincerely hope and trust that he may be long spared to render similar services in the future.

Dr. Mill has been succeeded, as librarian, by Mr. Heawood, whose experience as a field geographer, literary accomplishments, and intimate knowledge of our library make him a great acquisition to the Society.

During the past year considerable progress has been made by our School of Geography at Oxford. The attendance of students is highly satisfactory, and the institution of a Geographical Diploma by the University cannot fail to have a marked effect on the position of geography both at Oxford and at our public schools. There is reason to hope that, in the reorganized University of London, geography may in time be given a place of considerable importance in examinations. There is a Board of Geographical Studies in connection with the University, of which our secretary, Mr. Mackinder, and Mr. Chisholm are members. This Board is at present considering the place which geography should hold in matriculation, intermediate, and degree examinations, in certain of the faculties. If the place accorded to this subject is what we should all desire to see, there can be little doubt

that the recognition will lead to a marked improvement in geographical education throughout the country. In other directions there are gratifying signs, especially in the action of several School Boards, that geography is gradually winning its proper place in education.

Our Cambridge reader in geography, Mr. Yule Oldham, gave a course of lectures on the physical aspects of geography in the last Long Vacation, with the co-operation of Prof. Davis, of Harvard. The class numbered over two hundred, including many school teachers. During the academic year, Mr. Yule Oldham has given courses of lectures at Cambridge, which have been well attended by undergraduates.

With reference to the teaching of our science, I wish to draw special attention to the enterprise of Messrs. Andrews and Dickinson, whose slides, maps, and geographical pictures are a decided improvement on anything else that is available. Both of them are geographers and experienced teachers, and it is to be hoped that they will meet with sufficient encouragement to induce them to persevere in their enterprise.

On the retirement of Mr. Coles from the office of Map Curator and Instructor in April last year, there was unfortunately an interval of two months when instruction had to be suspended. Mr. Coles's place, as Instructor, was then taken by Mr. Reeves, who had succeeded as Curator. During the ten months that have since elapsed, Mr. Reeves has had forty pupils receiving instruction from him in surveying and astronomical observations. Out of this number three have obtained the Society's Diploma. Mr. James McCarthy, who has been the official surveyor in Siam for twenty years, is expected home in a few days, and it is anticipated that, in accordance with the arrangement made by the Council, he will then take up the work of instruction, which has attained such dimensions as to require the undivided attention of one official. I have every reason to believe that Mr. McCarthy will maintain this important branch of our operations at the high level that it has attained under Mr. Coles and Mr. Reeves.

Since I addressed you at the opening meeting of the Session last November, nothing of importance has occurred in the way of exploration. Major Gibbons has described to us the valuable work he accomplished in the Barotse country, and his journey thence to Cairo. His work has been embodied in a new map of Barotse, which will not only include Major Gibbons's observations, but all the trustworthy data collected by other travellers. Mr. Ravenstein has been engaged on this map for some time, the delay in its completion being accounted for by the vast amount of detail which has to be examined and embodied.

Several communications have been received from Sir Harry Johnston, the Special Commissioner in Uganda. I gather from them that Sir Harry, as is his wont, has been very active during the time he has

spent in that region. He has made journeys to most parts of the country under his charge, and will probably leave for England by the end of May. But before starting he will make the ascent of the great extinct volcano, Mount Elgon, a mountain region of special interest to the geographer. Sir Harry will bring home with him about a thousand photographs and maps, with valuable notes, which will form an important contribution to our knowledge of Uganda. I hope that he will give us a paper on his journeys at the opening meeting of next Session.

A very distinguished African traveller has just returned from another part of that continent. General Sir Frederick Lugard has had a trying time in Nigeria during the last eighteen months. He is strongly impressed with the value of good maps in conducting the work of developing such a region as is included in the European Protectorate of Central Africa. He has, therefore, devoted especial attention to the work of surveying, and I have reason to believe that he has returned with a mass of material from which an excellent new map of Nigeria may be constructed.

An admirable scheme has been prepared by the Intelligence Department of the War Office under Sir John Ardagh, which has issued an index map of Africa on the projection and plan of the map of the world on the one-millionth scale suggested at the International Geographical Congress of 1895. All those parts of Africa which have been actually surveyed are shown on the index map. They are, at present, insignificant in extent. The scheme of the Intelligence Department is to obtain from the various Governments and Geographical Societies which have an interest in Africa, the material available for filling in the map, and to issue the sheets as they are completed. It is a very laudable undertaking, but, in order that it may have a satisfactory result, accurate surveying operations will have to be undertaken. It is hoped that our Government, in conjunction with the Colonial Governments and the local administrations in the African Protectorates, will do all in their power to carry out the careful surveys necessary for the completion of the work.

We have to lament the loss of more than one distinguished geographer since our last anniversary. Our science has suffered a serious loss in the death of our Gold Medallist, Dr. George Dawson, the Director of the Geological Survey of Canada. His successor, Dr. Robert Bell, has had many years' experience in survey work, and I feel confident that he will maintain the high level which the Canadian Survey has attained. We also have to mourn the premature deaths of our gallant young associate, David Carnegie, of Dr. Schlichter, and of Mr. Frederick Pullar, a very promising young geographer, especially in connection with lake investigations. I fear that Sir John Murray will find it difficult to secure the services of one equally

competent and equally keen as a colleague to complete the work connected with British lakes which has been so well begun under his auspices.

I noticed the work of the Duke of the Abruzzi and of the Danish lieutenant Amdrup on the East Greenland coast in my opening address last November. Mr. Baldwin and Captain Bernier have not yet started on their attempts to reach the North Pole, and we must still wait some months before we can hope to hear news of Captain Sverdrup and Lieut. Peary.

We now have before us the geographical results of Mr. Borchgrevink's expedition to the Antarctic regions, and I consider that the expedition has done valuable pioneer work. Mr. Borchgrevink has published his book, and one of his staff, Mr. Bernacchi, has read us a very interesting paper at an afternoon meeting last March; while to Mr. Colbeck we are indebted for the maps and astronomical observations. The experiences of the *Southern Cross* in the pack add useful evidence to our previous information respecting the meridians on which that formidable obstacle should be entered. During the sojourn in Robertson Bay an instructive meteorological journal was kept, and the report on the geological and biological collections will no doubt show valuable results; but it is not yet published. I consider the most useful result of the voyage of the *Southern Cross* to be the important and interesting additions to our knowledge of the nature of the coast from Coulman Island to Cape Gauss, which have been made by the observant explorers. The fact that a landing was effected without difficulty on the great ice-barrier of Ross is also a notable result of the voyage. Mr. Borchgrevink here reached the furthest south ever yet attained. I feel bound, therefore, to bear my testimony to the value of the fresh information that we have derived from Mr. Borchgrevink's expedition.

The equipment and all the arrangements connected with our own Antarctic Expedition are approaching completion. I am anxious, in this address, to impress upon my colleagues the great responsibility that has been undertaken by the two associated Societies in despatching the expedition; to recognize the cordial assistance that we have received, especially from official sources; and to recapitulate our system, our objects, and the plan of operations through which we hope to secure success.

The Royal Society and the Royal Geographical Society are both actuated by one object, the advancement of science and the gathering in of important additions to the sum of human knowledge. The ancient and illustrious body which has entered upon this great national work in co-operation with us possesses a record which, as geographers, we revere. In the days of Sir Joseph Banks the science of geography was, for forty years, one of the chief cares of the Royal Society. We do not forget this. We do not forget the debt that geography owes to the great mother Society, and we feel it to be an honour to be associated with it in this important enterprise. In the course of our mutual labours, in

the consideration of so many intricate questions, I will not deny that there have been differences of opinion. This was inevitable with independent minds approaching problems from slightly different points of view. But the application of common sense will always dissolve such obstacles to a full agreement, and now I rejoice to be able to say that there is complete accord between the two Councils.

Our own Society has made great sacrifices for the promotion of a work which, I am sure, we all have at heart; and the subscriptions of our Fellows have been numerous and liberal, in one instance munificent. I desire, however, on this occasion, specially to commemorate the help we have received from the Government, and the sympathy our officers have met with in many directions. As soon as our expedition had received such an amount of support as proved that it would be a national undertaking, the First Lord of the Treasury took the question into favourable consideration. Mr. Balfour soon perceived not only that results of very great importance were to be expected from the expedition, but that its support was a matter of national and even of international consequence. This enlightened statesman obtained for us the grant from the Treasury; and we thus received a *status* which enabled the Admiralty to do something more than look upon our undertaking with favour.

As long ago as April, 1897, I had an interview with the First Lord of the Admiralty, who expressed sympathy, but could not then hold out any hope of material help. He, however, promised that, if an expedition was sent out, the Admiralty would supply the scientific instruments and appliances. But the position given to us by Mr. Balfour's effectual intercession changed the attitude of the Admiralty. In April, 1900, Mr. Goschen promised me two excellent officers, and since that time we have had to thank the Admiralty for much sympathetic help in many ways. Their lordships have lent us the services of no less than four naval officers, as well as petty officers and men, who are to receive pay and allowances during their absence. Stores at cost price have also been allowed to the expedition, in addition to the scientific instruments and appliances promised in 1897, which have been provided under the superintendence of the hydrographer, Sir William Wharton. Last, but assuredly not least, we are indebted to Sir William White for the invaluable services of Mr. W. E. Smith, one of the chief constructors, in designing the ship, and superintending the building throughout. The best thanks are certainly due to the Lords of the Admiralty from all who are interested in the expedition.

We also have to thank the chairman and directors of the P. and O. Steam Navigation Company for lending us the valuable services of Lieut. Armitage, R.N.R.; while the acts of kindness and sympathy from individuals have been numerous and most gratifying. Firms, such as Messrs. Colman and Messrs. Cadbury, have made liberal reductions and presents, and the publishers have been most kind in

making handsome presents to the library. In all these things we recognize that warm feeling for those who are about to brave dangers and hardships for their country's credit, which has always distinguished the English people. Nor must we be unmindful of the active sympathy shown by our foreign well-wishers. Through the intervention of my friend, Dr. Don Francisco Moreno, the Argentine Government has shown its desire to help in the work of antarctic research by liberally undertaking to establish a magnetic observatory on Staten Island. It will be in charge of a lieutenant of the Argentine navy, Don Horacio Ballvé, who is now in Europe ordering the instruments, and will dine with us to-night. For this useful co-operation our warmest thanks are due to their Excellencies, the Argentine Minister of Foreign Affairs, and Señor Dominguez, the Argentine Minister in this country, and to Dr. Moreno.

All who know anything of his work during the last nine months, must feel that in Commander Scott we have got the right man in the right place. To him alone is due the advanced state of the preparations. With a genius for organization, a clear head, an unfailing memory, he has seen to every detail himself, while he has made himself master of the problems that we look to him to solve. All this gives bright promise of what we may expect from this able and resourceful young officer in dealing with the sterner work that is before him. He is most ably supported. In Lieut. Armitage we have an accomplished navigator, of great arctic experience, and with a long training in sledge-travelling. Lieut. Royds, a nephew of Wyatt Rawson, who was the finest type of an arctic officer, Lieut. Michael Barne, Mr. Ernest Shackleton, Mr. Reginald Skelton, the engineer, Dr. Koettlitz, who also has arctic experience, and Dr. Wilson, an excellent artist, will form the staff of officers of the ship. There will also be a geologist, a biologist, Mr. Hodgson, and a physicist, Mr. W. Shackleton, to conduct investigations in their several departments. Mr. Hodgson has been for a cruise in the *Michael Sars* with Dr. Hjort, while Lieut. Royds has been to the summit of Ben Nevis, in mid-winter, to see the recording system for meteorological observations obtaining there, and to Lerwick after men. All are actively employed.

Mr. George Murray, of the British Museum, will direct the operations of the civilian staff during the passage out, and will get everything connected with their departments into thoroughly good working order. The magnetic observations, under the special supervision of the commander, will consist of a magnetic survey right round the world to the south of the 40th parallel, during the voyages out and home, across the oceans. This will be the principal magnetic work. Special interest attaches to the area in which the maximum magnetic intensity is expected to be found, south of Australia, and this area will be traversed. Observations will also be taken as far south as possible in the Ross sea. The commander will establish a magnetic base station

at one of the observatories, either Melbourne or Christ Church, New Zealand, and a secondary magnetic base at his winter quarters. Meteorological observations will be taken every two hours, and at Greenwich noon, throughout the period of the expedition. At the winter quarters, which will be south of the 74th parallel, they will have a special interest with reference to the anti-cyclone supposed to exist from about 74° south to the pole. These observations will all be under the direct supervision of the commander.

Deep-sea soundings will be taken, whenever it is possible, with serial temperatures, and samples of sea-water at various depths will be obtained for physical and chemical analysis. Tidal observations will be taken at the winter quarters. Dredging operations will be carried on whenever the circumstances are favourable, and it is the intention of the commander to dredge at considerable depths, so as to make the collection of antarctic flora and fauna as comprehensive as possible.

At my request, Mr. George Murray has undertaken to edit the 'Antarctic Manual,' which will be the work of various contributors, and will, as far as possible, embrace all that is known of the phenomena of the Antarctic Regions in the various branches of science. Our assistant draughtsman, Mr. Batchelor, has prepared the maps under my superintendence. The Manual will be most valuable to the officers, and will also be issued, as an extra volume, to our Fellows. The 'Antarctic Manual' will be dedicated, at Mr. George Murray's suggestion, to Sir Joseph Hooker, the venerable survivor of Sir James Ross's Antarctic Expedition.

The all-important measures, with reference to the conveyance of these trained officers and scientific civilians to their destined work, are connected with the provision of a suitable ship. This was, of course, the first question which engaged our attention. I ascertained the capabilities of existing vessels belonging to Scotland and Norway, and arrived at the conclusion that, effectually to meet and overcome the difficulties and dangers of the antarctic pack, it would be necessary to build an exploring ship specially designed for navigation in the southern ice. On April 5, 1899, in reply to my application, Sir William White was so good as to suggest to me that I might secure the services of Mr. W. E. Smith, one of the chief constructors, as architect of the exploring ship, and, most fortunately for the expedition, Mr. Smith was able to accept my proposal. I then called together a ship committee of arctic officers, who decided the general lines for the ship, and on April 17 Mr. Smith completed the plans. It was further decided, in May, on the representation of Captain Creak, that the magnetic observatory should have no steel or iron within 30 feet of it. This arrangement involved considerable expense and some sacrifice in other respects; but we feel assured that the value of the results will amply repay us.

The only firm in the kingdom that could undertake to build such

a ship was the Dundee Shipbuilding Company, and their tender was accepted in December, 1899. It was no easy task to collect the oak timber and other materials; nor could a sufficient number of wooden shipwrights be found anywhere else. I feel bound to bear my special testimony to the excellence of the work done by Messrs. Gourlay, the firm which built the engine. Our thanks are also due to our able architect, Mr. Smith; and to the chairman and secretary of the Ship Committee, Admiral Sir Leopold McClintock and Admiral Markham. Admiral Sir Anthony Hoskins should also receive the warmest thanks from all who are connected with or interested in the expedition, for his indefatigable and successful exertions on its behalf.

The naming of the ship was not an unimportant matter. Out of twenty names, I selected that name which best described her work, the work of discovery. In 1881 I edited the voyages of William Baffin, who discovered the bay which bears his name 285 years ago, and I remembered that his little vessel was named the *Discovery*. The first lunar observation ever taken by an English sailor was made on board her, as well as other scientific work which constituted her the prototype of exploring ships. Vancouver's ship had the same name, and so had one of Captain Cook's ships when Icy cape was sighted; so had Sir Harry Stephenson's ship, built in the same yard, which carried such men as Beaumont and Wyatt Rawson to the polar regions. It is a good name, worthily borne by ships of renown in the days of old; so on March 21, 1901, Lady Markham launched our Antarctic ship at Dundee, and named her the *Discovery*. She is one of the strongest ships ever constructed for ice-navigation, and the first ship ever built in this country specially for exploration and discovery. I am glad to be able to announce that the results of her trial trip last week were perfectly satisfactory. The *Discovery* will be handed over to Captain Scott in a few days, and will be brought round to the East India Docks by the end of the month. Our special thanks are due to Mr. C. Scott and the directors of the London and India Docks Committee for their liberality in resolving not to make any charge whatever to the *Discovery* for the use of their dock. Our Council has undertaken the duties and responsibilities of ownership, and your President will have to be "director" in accordance with the provisions of the Act of Parliament.

We have thus got the ship, and the scientific appliances, and right good men to navigate the ship and use the instruments. It remains to report to you the plan of operations.

My considerations respecting routes for an Antarctic Expedition will be printed at the end of this address. It will be seen that, for a small expedition with a single ship, the wisest course is to work from the known to the unknown, and this can only be done in the Victoria and Ross Quadrants, embracing the meridians from 90° E. across 180° to 90° W. Accordingly, I arranged with Dr. von Drygalski, the

Commander of the German Expedition, in October, 1899, that our sphere of work should be the Victoria and Ross Quadrants, while the Germans undertook the Enderby Quadrant.

Assuming that the exploring period will consist of two navigable seasons and one winter, the ice-pack should be sighted in December, 1901, and the ship should be forced through the ice on a meridian which the commander, after careful consideration of previous voyages, may decide upon as likely to be least encumbered with pack-ice. The whole navigable season, after reaching the south water, will be devoted to exploration in the ship. She will be taken down the east coast of Victoria Land, where open water may be expected, and eastward along the famous range of ice-cliffs discovered by Sir James Ross. An examination of this barrier, with a view to discovering the nature and origin of the ice-mass of which it forms the northern termination, is one of the principal objects of the expedition.

For sixty years this astonishing geographical phenomenon has been a subject of interest and speculation. It was supposed, by the late Mr. Croll and others, that the ice-cliffs were the termination of a vast ice-cap extending to the south pole. Mr. Bernacchi believes that the cliffs are one side of a glacial flow from the Parry mountains, a huge tongue of ice, and his chief reason for this opinion is that the slope is from west to east, not from south to north. His paper on the subject, which was read at an afternoon meeting last March, at which Sir Joseph Hooker and Mr. Blanford were present, was interesting and suggestive. My own impression, indicated in my paper of "considerations" which will accompany this address (p. 13), is that the ice-cliffs terminate a glacial mass between two mountain ranges, and thus fill an extensive sound or gulf. I think Mr. Blanford concurs in this view. The solution of this problem would be a brilliant result of the navigable season of 1901–2. Captain Scott will probably endeavour to advance eastward beyond the point reached by Sir James Ross, and it may be hoped that he will either discover the existence of land, or ascertain that land does not exist in that direction. The commander intends, if possible, to add a captive balloon to his equipment, a course which is strongly advocated by Sir Joseph Hooker.

But it is desirable that the expedition should return to the east coast of Victoria Land in time to establish the ship in safe winter quarters, if Captain Scott, in the exercise of the discretion that will be given to him, should consider that course advisable. It is a well-established canon, based on all former experience, that, in order to secure the best results for a polar expedition, the ship must winter. Sir James Ross fully intended to winter, and made a strenuous effort to find winter quarters. The leader of the German Expedition fully intends that his ship shall winter. Indeed, the observations which are among the results we seek, and the all-important exploration by land, could only be carried

out by the whole force of the expedition, which at best is not numerically too strong.

I therefore trust that Captain Scott may be able to find safe winter quarters for the ship. The evidence of the staff of the *Southern Cross* is that there are such winter quarters at Wood Bay in 74° 25′ S. There may be others further south, and possibly in McMurdo Bay. But it has been necessary to confine the area within which the ship may winter between Cape Johnson, the northern point of Wood Bay, and Cape Crozier, at the foot of Mount Terror. These limits are fixed so that, in the event of accident or detention, the ship may be easily found. Every arrangement has been made for wintering, and there will be three years' provisions on board.

The work of the dark months of winter will be occupied by observations of various kinds, taken by a staff efficiently trained and sufficiently numerous. Observatory huts will be erected on shore. In Wood Bay there is a level area of 150 acres suitable for this purpose. There will be a hut for magnetic observations, the instruments including a magnetograph. The meteorological observations will be regularly taken on shore as on board, and Captain Scott is considering the advisability of flying specially constructed kites with meteorographs. He will also be supplied with electric thermometry. Pendulum observations will be taken with an instrument supplied in this country; and Captain Scott will also install a seismological observatory with the instrument recommended by Prof. Milne. Tidal observations will be regularly taken. For all this work there will be a sufficient number of observers, but certainly not too many; and the dark winter months will be most usefully employed.

With the arrival of the sun the great land exploration work of the expedition will commence. Captain Scott has received complete details respecting every phase of sledge-travelling from Sir Leopold McClintock and Dr. Nansen, and has personally superintended the preparation of all the different articles of equipment. He has obtained a small supply of dogs from Siberia, and will perhaps take some of those belonging to Sir George Newnes from Stewart Island. In Lieut. Armitage the commander will have the valuable help of an officer who has had great previous experience during four seasons of dog-sledge travelling. The conditions of antarctic travelling are unknown. It is probable that dogs will be available in some directions, and that different methods may have to be adopted in others, much depending on the weather, and nearly everything else on the character of the country. But Captain Scott will doubtless adapt his methods to the exigencies of each case.

One sledging expedition, supported by depôts, will be directed due south; and we learn from the observant staff of the *Southern Cross* that the way round the eastern shoulder of Mount Melbourne, and along the ice-foot to McMurdo Bay, presents little difficulty. Another party will

probably be told off to examine the volcanic region of Mount Erebus. But the most important route will doubtless be to the westward, between Capes Gauss and Washington, where the land is low, where no distant mountains can be seen, and in which direction, by a system of carefully thought out depôts, a great distance may be reached, entailing important discoveries.

In this sledge-travelling I look hopefully forward to great results. No one yet has ever equalled or even approached the achievements of British naval officers in polar travelling. It is their own special work. I am taken back in thought to that memorable April day in 1851, when Captain Austin addressed the assembled sledge crews on the ice off the north-west point of Griffith Island. The distinctive flags of the officers were flying in the breeze and enlivening the white landscape, and then fourteen sledges started, with crews full of zeal and resolution, east, west, and south.

Over half a century will have passed away, and the eye of hope sees another gallant band; of another generation, assembled on an antarctic shore, with the leaders also flying their distinctive flags, and resolved that, in spite of hardships, in spite of dangers, good honest work shall be done beneath them. May our friends succeed in all their efforts. May they bring back a rich harvest of scientific results. The good wishes of their countrymen go with them. For apart from war there are great and good services for our gallant sailors to perform, and other paths to distinction.

> "Yes! there are paths in which success would shed
> Unfailing laurels on the victor's head;
> Do ye, by star-eyed science led, explore
> The icy ocean, the snow-encumbered shore."

To my mind this is the most important work of the expedition. Our explorers will, we earnestly trust, return safely, and without serious loss or injury, to the ship. But the difficulties will be great, the perils numerous.

Then will come the labour of cutting and blasting the ship out of the ice, and no better man could be in charge of such an operation than a torpedo officer. There is reason to hope that a ship may be cut out of the ice at an earlier period of the navigable season than that in which she can be expected to reach the land from outside.

It may be anticipated, therefore, that further exploratory work may be undertaken during the second navigable season of 1902–3. There are discoveries of great interest to be made westward of Cape Adare, either by pushing beyond Cape North or by examining the sea near the antarctic circle between the meridians of 160° and 110° E. The question whether there is continuous land, or only a group of islands in this direction, is a geographical problem of great interest which still awaits solution. The *Discovery* would return to her base station, at Lyttleton

(New Zealand), in April, 1903, to recruit men and officers, and fill up with coals and fresh provisions. She would then proceed with her magnetic survey across the Pacific, returning to this country in August.

This will be a very glorious achievement, even if one quarter of what is contemplated and suggested can be done; for the difficulties and dangers of the undertaking cannot be exaggerated. We who send our gallant countrymen forth on this hazardous enterprise are bound to see that all has been done that human foresight can devise to ensure their comfort and safety. It is necessary that there should be a second ship ready to proceed south in November, 1902, in the possible contingency of any accident, or of the detention of the *Discovery*. It is also very desirable that there should be sufficient funds for a third year. But the first of these objects is essential. There must be a tender to the *Discovery*—a second ship. The required funds must be raised. The feeling that this is necessary is becoming strong among those of our Fellows who have a sense of responsibility. I have just received a letter from a Fellow of this Society, who writes as follows: "On the assumption that the instructions for the conduct of the National Antarctic Expedition are definitely settled to the satisfaction of our Council, I shall be glad to contribute £5000 towards the provision of a second ship, the necessary tender to the *Discovery*." Another well-wisher has promised £500. We have thus had noble examples set before us. We are all bound to use our utmost endeavours to see that those examples are followed. It is our duty to see that all due precautions are taken for the safety of the gallant men who are going upon a perilous enterprise at our behest. *They* will do *their* duty, we know well. Let us do our duty by exerting ourselves in their interests. Then, when the time comes for the *Discovery* to start on her memorable voyage, with all on board resolved to do their utmost for the credit of Old England, we can, with a clear conscience, join in the hearty cheers of farewell. Then we can all raise the glorious cry, without anxiety, of "Southward Ho!"

CONSIDERATIONS RESPECTING ROUTES FOR AN ANTARCTIC EXPEDITION.

By Sir CLEMENTS R. MARKHAM, K.C.B., F.R.S., President R.G.S.

THE time has arrived for settling the plan of operations for the Antarctic Expedition; and I propose, after stating the objects laid down by the Councils of the two Societies, and offering some general observations, to pass in review the several routes which may be taken to reach the unknown region of the South.

The objects are stated in the report of our Antarctic Committee, which was adopted by the Council on February 12, 1894; and in the

Reports of the Antarctic Committees of 1887 and 1894, appointed by the Royal Society.

The main objects are to determine, as far as is possible, the extent and nature of the south polar land, to ascertain the nature of its glaciation and the condition of the ice-cap, to observe the character of the underlying rocks, and to make a magnetic survey south of 40° S. Much importance is also attached to meteorological observations, and especially to meteorological observations to the south of 74°. Deep-sea soundings with temperatures are also to be taken, and biological investigations are to be made.

The soundings and dredging work, outside the antarctic circle, can, however, be done at any time and in any vessel. It is not, therefore, a main object in a vessel specially built and strengthened for work within the antarctic circle; and for magnetic observations.

Without losing sight of the main objects of the expedition, it is desired by the Councils of the two Societies that as large results as possible shall be obtained for all the branches of science concerned. We cannot completely satisfy specialists as regards any one investigation, but all will be done that is possible to satisfy each, with due regard to the claims of others. There will be the work on or near the shore, and the work at sea. The first class of work includes (1) geographical discovery and exploration; (2) geology; (3) glaciation; (4) magnetic observations; (5) meteorological observations; (6) pendulum observations; (7) tidal observations; (8) inshore and land biology. Magnetic observations are especially important to ascertain the changes that have taken place since Ross's survey, and they should be carried to the most southerly latitudes attainable. The series of meteorological observations in winter quarters south of 74° S. possess more than ordinary importance with reference to the belief of leading meteorologists respecting an anti-cyclone. The work on board ship at sea includes (1) examination and survey of coast-lines; (2) magnetic observations; (3) meteorological observations; (4) deep-sea soundings; (5) marine biology. The subjects for investigation on shore are the most numerous and important. But we must arrange to give due attention to all. If the expedition continues its work for two years, and the ship winters, there would be ten months for the shore investigations, ten months for the work at sea, and four for the voyages out and home. With regard to the navigable period, Captain Larsen found the water on the east side of Graham island open in December. If the expedition lasts for three years, there will be a much longer time for the work at sea. The sea work will be continuous throughout the period of the expedition while at sea, whatever direction may be taken by the ship. It is, therefore, only necessary to consider the route with reference to the exploration of the unknown Antarctic lands. The exploration of the Antarctic Regions is also the object mentioned by the Treasury in announcing the Government grant.

Our expedition can in no sense be a reconnaissance. That work has been completely done. Indeed, all the antarctic voyages, except that of Ross, have been reconnoitring voyages along the edge of the pack. Our expedition must force its way through the pack. That is essential, and for this object the ship was designed and built. It must attempt a piece of definite work. The time at our disposal admits of no preliminary reconnaissance. It is also necessary that the ship should pass a winter in the far south, if the main objects of the expedition are to be attained. The German expedition will certainly winter. Sir James Ross saw that this should be done, and was anxious to find a position for winter quarters. In that respect, as well as in others, the advantage of a steamer over a slow sailing ship will be found to be very great. The idea of leaving a small landing-party on shore to pass the winter should be dismissed; as a weak party—and it must necessarily be weak—could not do a tenth part of the work that would be achieved by the whole force of the expedition.

The magnetic base of the expedition will be either at Melbourne or Christ Church (New Zealand), there being magnetic observatories at both places. The Germans will establish a magnetic observatory at Kerguelen island. The Argentine Republic, through the kind intervention of my friend Dr. Don Francisco Moreno, has undertaken to establish a magnetic observatory on Staten island.

In taking a general view of the Antarctic Regions, it is found that south of 40° S. there is very low atmospheric pressure all round the globe, with very large rainfall and snowfall, and strong westerly winds producing a current flowing to the east. But the winds south of 74° are from south and south-east, with surface currents in the same direction, so that the icebergs and the pack ice are continually drifted northwards during the summer. It is therefore assumed that there is a large anti-cyclone, with higher atmospheric pressure, far to the south; and that the south winds are attended by small precipitation. This, of course, means a considerable amelioration in the climate south of 74° or 75° S.; but no winter has yet been passed in so high a latitude. From this point of view, a winter south of 74° S. is, as I have already pointed out, an object of great importance.

It is very desirable to obtain some idea of the position and extent of the antarctic land, and it would seem that indications may be obtained from the position of the isotherm of 32° Fahr. air-temperature in summer. Where it is driven far to the north, the cause may perhaps be attributed to a great mass of frozen land on those meridians causing a high degree of cold; while in parts where it is far south a warmer region is indicated, caused by an extensive ocean with perhaps only a few islands. From 80° E. to the meridian of Greenwich this isotherm is as far north as 56°, and on these meridians is Enderby Land with its range of ice-cliffs, suggesting a very extensive land mass. But

from about 45° to 90° W. the isotherm is in lat. 63°, pointing to the landless Weddell Sea. So that the position of this isotherm possibly gives us some clue to the shape and extent of oceans and land masses far to the south of it.

The positions of extensive seas and land masses influence the position and movements of the polar ice-pack in its drift to the north. These would be more irregular in proportion to the extent of the sea over which they drift. In the Weddell Sea D'Urville found the pack in 64°, Ross in 65°, while Weddell himself had not reached it when he was in 74° 15'. Further east Ross found it in 71°, Bellinghausen in 69°, Biscoe in 66°. It varies also very much in character, in some places and times being loose and open, in others very close. There is very great difference in the position and character of the antarctic ice-pack in different seasons and in different localities; but the main difference, as regards navigation, is between a sailing vessel and a steamer, a difference which is almost immeasurable. There can be little doubt that a steamer might force her way through the pack on any meridian when there is open water to the south.

We know as yet very little of the antarctic lands, but we must use that incomplete knowledge as some guide for future work. The first question that arises is the source of the enormous icebergs which encumber the antarctic sea in such vast numbers. In the Arctic Regions, we know that the icebergs are derived from the discharging glaciers at the heads of narrow Greenland fjords. But the antarctic icebergs are on a much larger scale. Sometimes 1 and 2 miles in length, generally 150 to 200 feet high, they are flat-topped like the ice mass from which they are discharged. So far as we yet know, all antarctic lands have these ice masses ending in cliffs along their northern faces. Sir James Ross saw a range of bergs which had evidently broken off from the ice-cliffs stretching eastward from Mount Terror.

The range of ice-cliffs forming the termination of very extensive glaciers appears to be an invariable feature of the northern faces of antarctic lands. There is Enderby Land, which, from Captain Biscoe's description, is a long range of ice-cliff. There is Côte Clarie. There is the north side of Victoria Land, which Ross and McCormick describe as a long range of ice-cliffs stretching westward from Cape North. There is the long line of ice-cliffs extending eastward from Mount Terror, near the parallel of 78° S. for upwards of 400 miles.

These mighty glaciers, pouring their harvests of icebergs out into the seas which bound the northern coasts of antarctic lands, appear to be flanked on their eastern sides by ranges of lofty mountains running north and south — possibly on both sides, like Greenland. Biscoe reported them as black streaks seen through the mist to the east of Enderby Land. D'Urville saw them east of Côte Clarie. A lofty range of mountains flanks the eastern side of Victoria Land, and Ross was

almost sure that he could see high mountains beyond the eastern end of the great ice-barrier in 78° S.

A navigable sea may usually be expected on the eastern sides of antarctic lands, while the northern drift of ice may cause a similar lane of open water along the northern coasts in the summer. There may, therefore, be three reasons for open water in the antarctic seas: firstly, the currents drifting the ice away from the land; secondly, open lanes and pools caused by unequal rates of ice-movement in the pack, under the influence of winds and currents; and thirdly, the open water usually found north of the outer edges of the pack.

These general considerations apply to all parts of the Antarctic Regions. In examining the various routes by which the unknown area may be penetrated, it will be well to do so with reference to the four quadrants into which the Antarctic Regions have been divided for convenience of description: (1) the VICTORIA QUADRANT, from 90° E. to 180°; (2) the ROSS QUADRANT, from 180° to 90° W.; (3) the WEDDELL QUADRANT, from 90° W. to 0°; and (4) the ENDERBY QUADRANT, from 0° to 90° E.

I. VICTORIA QUADRANT.

First Route.

We turn first to the Victoria Quadrant, and find indications of land near the antarctic circle, from 122° E., where Balleny discovered Sabrina Island, a lofty mountain range covered with snow, on March 2, 1839, to the Balleny Islands in 165° E., also discovered by Balleny on February 12, 1839. The Balleny Islands are of volcanic formation, and have lofty peaks. Between these two points, Dumont d'Urville discovered Adelie Land in 140° E., lofty land nearly hidden by icebergs, on January 20, 1840. The French landed on one out of eight or ten rocky islets about a mile from the shore. Further west, in 128°, D'Urville sailed along a vertical wall of ice, 100 to 150 feet high, for twelve hours. He named it Côte Clarie.

Captain Wilkes, following in the wake of Balleny in 1840, reported distant mountains connecting the discoveries of Balleny and D'Urville and laid down a coast-line of vast extent representing land of continental proportions. But Sir James Ross found himself "nearly in the centre of the mountainous patch of land laid down in Lieut. Wilkes's chart." Sir George Nares saw nothing of Wilkes's supposed Termination Island when within 15 miles of it, and there were such discrepancies between the statements of Captain Wilkes and his officers that the matter remains in doubt. It is a question of great geographical interest; but we are only certain of Sabrina Island, Adelie Island with Côte Clarie, and the Balleny Islands. Ross believed that Wilkes's land was a chain of islands.

Sir James Ross had no doubt that the islands he sighted on March 3

and 4, 1841 (Russell Peak, Smyth Island, and Frances Island), were the same as the Balleny Islands. But Mr. Colbeck tells me there are two separate groups, not far from each other. Balleny gave the following names to the five islands he discovered; *Sturge*, *Buckle*, *Borradaile*, *Young*, and *Row*.

The isotherm of 32° Fahr. is as far south as 62° S., from 140° to 80° W.—a possible indication that Sabrina and Adelie are only large islands, and that any continental land is far to the south. In fact, there is a space of 250 to 300 miles in width between these indications of land near the antarctic circle and Victoria Land.

The north coast of Victoria Land commences with Cape Adare, the eastern point, a lofty headland of volcanic rock, in 71° 30′ S. Thence the land trends north-west 120 miles to Cape North. In February, 1841, a solid pack extended for 8 or 9 miles from the shore near Cape Adare, rendering a landing impossible, while in 1895, 1899, and 1900, a ship was able to approach close to the shore. This is one example of the changes that take place in the position of the pack.

The next cape westward of Cape Adare is Cape Wood, and between there is a deep bay, which Sir James Ross named Robertson Bay. Here lofty inaccessible mountains rise almost from the beach. The northern extreme of land seen by Ross was named Cape North. The land then trends far to the south of west, but off Cape North Ross was stopped by a dense body of ice, on February 22, 1841. He was anxious to find winter quarters, but all the indentations of the coast were filled with ice of great thickness. Beyond, the line of coast consisted of a long range of ice-cliffs 200 and more feet high, with a chain of grounded bergs some miles in front of them; soundings in 180 fathoms. The ice-cliffs probably form a coast-line of considerable extent, and a dense pack of ice occupied the space to the north and west.

The Newnes Expedition wintered on shore, in Robertson Bay, from February, 1899, to February, 1900, and a valuable series of magnetic and meteorological observations was taken by Mr. Colbeck and Mr. Bernacchi. The position, so close under lofty mountains, and where the coast turns abruptly from east and west to north and south, probably has a climate which is quite abnormal. No attempt was made to explore along the coast to the westward.

The first route, in the Victoria Quadrant, would pass through the pack to Cape Adare, and then westward over the sea which is bounded on the south by the north coast of Victoria Land. The pack met with by Ross might be rounded, early in the season, at its northern edge, it might have moved, or it might be penetrated. The results of success in this direction would be of great interest both to geographers and magneticians. The extent of Victoria Land to the westward might be ascertained, and the questions connected with the indications of land on the antarctic circle between the meridians of 120° and 160° would

receive solution. On the other hand, there appear to be great accumulations of pack-ice in this direction.

Second Route.

The second route in the Victoria Quadrant is that indicated by the famous voyage of Ross, who was obliged to leave the work undone owing to the want of a steamer. In slow sailing-vessels it was not possible for him to seek out and make his way into secure winter quarters, so that he only pointed out the quantity of valuable work that might be done. Borchgrevink followed in Ross's wake. Only six landings have been effected, each for a few hours or less. These landings have been on Possession Island in 72°, Coulman Island in 73° 20', Wood Bay in 74° 22', Franklin Island in 76° 10', near Cape Crozier in 77° 25', and on the ice-barrier in 162° 30' W.—two by Ross and four by Borchgrevink. The work here remains to be done, and it is work of extraordinary interest. For nearly 300 miles there is a line of coast facing to the eastward, and therefore with a navigable sea along its shore. It is flanked by a range of lofty mountains running north and south, while in the far south is the active volcanic region of Mount Erebus. Then stretching away for hundreds of miles to the eastward is that famous ice-barrier, the scientific investigation of which is one of the chief desiderata of geographers.

In approaching this route, Sir James Ross entered the pack in 66° 55' S. and 174° 34' E. on the 5th, and reached open water on the 9th of January, 1841. There is reason to suppose that at least equal success might be obtained by a steamer early in December, which would at once proceed to the most eastern point reached by Ross along the barrier. The steam power may outweigh the greater closeness of the pack early in the season. At the most eastern points of Ross and Borchgrevink the pack was pressing against the barrier late in February of 1842 and 1900, but this may not be the case in another year, and the pack may not be impenetrable in December, when the frosts will not have cemented it together with young ice. In that case most important discoveries will be made to the eastward, especially if the land beyond the barrier turns to the south with an eastward face, and thus offers a navigable channel along its shore.

Later in the season there might be a thorough investigation of the ice-barrier and the interior ice-cap. Ross had concluded that the ice-cliffs could not be resting on the ground, after soundings at a depth of 420 fathoms and again at 250 fathoms. All this should receive investigation, and the character of the ice-cap should be studied. When a landing was effected in 1900, a distance of about 15 miles was reached by dogs drawing a sledge, and men on ski, along a gentle ascent of hard smooth snow. In the distance what appeared to be a hill proved to be hummocks of blue ice.

Unable to approach very near to inlets or bays for fear of being beset, Sir James Ross supposed them all to be filled with ancient ice, and to offer no winter quarters. But the *Southern Cross* was able to take refuge from the gales of wind far up Robertson Bay, and Wood Bay is also said to offer good winter quarters. Even if the ice in some of the bays never moves, that very fact will supply the necessary protection to a ship from drifting pack, especially if some kind of dock is cut.

McMurdo Bay is a desirable place for winter quarters, in full view of the great burning volcano. Here there is probably a better climate than at Cape Adare, because it is within the anti-cyclonic region. Thence journeys of the utmost importance could be undertaken, which would secure some of the main objects of the expedition. The volcanic region itself could be explored. A journey due south would enable researches to be made along the edge of the ice-cap, while a journey westward into the interior would be of equal importance, and would possibly effect co-operation with the Germans working in from the west. Wood Bay, however, is the best winter harbour, so far as we yet know.

This, then, is the route which offers the best prospect of securing the main objects of the expedition with the best chances of complete success and the minimum of risk.

II. The Ross Quadrant.

Third Route.

We will next consider the Ross Quadrant, extending from 180° to 90° W. south of the Pacific ocean. In 1842, Sir James Ross entered the pack near the antarctic circle in 156° 28′ W., and, after long detention from the ice and encountering some danger, he reached the ice-barrier in 161° 27′ W. on February 23. From this point, looking to the east, mountains of great height were made out, occupying 30° of the horizon, with an undulating outline. There appeared to be much drifting pack to the eastward.

Captain Cook reached the edge of the pack in 71° 10′ S., in long. 106° 34′ W., on January 30, 1774. The pack consisted of loose or broken ice closely pressed together, and within it ninety-seven bergs were counted, like a ridge of mountains rising one above the other until lost in the clouds. Sir James Ross, Dumont d'Urville, and others have been of opinion that what Cook saw was land. But Captain Cook himself was much the best judge on that point. Possibly the bergs may have been grounded, and if so land would not be very far distant. But the way the ice was seen to drift from the *Belgica*, without check, when near Cook's farthest, seems to show that there is no land near that latitude.

A powerful steamer might penetrate through the pack between

Cook's farthest and the track of Ross. She would then reach land by steaming across the navigable water beyond, and effect a considerable extent of valuable exploration. Such an examination of the Ross quadrant would include work of the greatest interest and importance to science, but not without considerable risk.

III. Weddell Quadrant.

Fourth Route.

The Weddell Quadrant, extending from 90° W. to the meridian of Greenwich, is divided into three sections—the first, from 90° to 60° W., is occupied by the Dirk Gherritz archipelago; the second, from 60° to 30° W., embraces the Weddell sea; and the third, from 30° to 0°, includes the rest of the pack edge examined by Sir James Ross.

In 1599 one of a fleet of five Rotterdam ships was said to have been separated from the rest. She was named the *Blyde Boodschap*, commanded by Dirk Gherritz. It is stated in a French collection of voyages to the Straits of Magellan, published twenty-three years afterwards, that Gherritz was carried by tempestuous weather to 64° S., where he saw a land with snow-covered mountains. Gherritz is not recorded to have said so; his journal does not exist, so far as I am aware, and no longitude is given. If he did not sight the land until he was in 64° S., he certainly did not discover the South Shetlands, which would have been far to the north; nor is it credible that a vessel trying to enter Magellan's Strait could have been driven so far south. In Van Noort's *Description du penible Voyage*, Gherritz is said to have been taken prisoner by the Spaniards at Valparaiso. Van Noort heard of him as a prisoner at Lima. He never appears to have returned to give an account of his voyage. The Cape Horn route was then unknown. Nevertheless the Dirk Gherritz archipelago is a convenient name for the South Shetlands and the numerous islands to the south, including Graham Island.

The only parts of the Dirk Gherritz archipelago which enter the antarctic regions are Graham Island and Alexander Island. The former was discovered by Captain Biscoe on February 14, 1832. He then saw a very high peak, which he named Adelaide Island, with a thin scattering of snow from the summit to a third of the way down, and the lower part buried in snow and ice. With reference to this bareness of the higher parts of some antarctic mountains, Arctowski observes that in making an ascent he passed through a belt of mist for the first few hundred feet, and above that there was an absolutely clear sky and dazzling sunshine, so that it is easy to see how the higher rocks become free of snow in summer, while those near sea-level remain covered.

In the following days Biscoe discovered several small islands further

north, and a long range of high mountains behind them. These form the backbone of Graham Island, which is long and narrow, extending on both sides of the antarctic circle. Further to the south, the Russian commander Bellinghausen had discovered Alexander Island in 69° 30' S. more than twenty years previously, in 1821. In February, 1898, the *Belgica* ran close along this western coast of Graham Island, noting the many rocks and islets extending to a considerable distance from the shore; but Alexander Island was inaccessible owing to the ice-pack. Arctowski describes the view obtained from a point at the edge of the pack. Graham Island seemed to terminate, the land turning towards the east. Alexander Island appeared to be a mountain mass, from which lofty and majestic peaks rose, with lower land to the south. The glaciers seemed to fail to reach the sea, but to coalesce together in one great ice-foot which discharges numerous tabular icebergs.

The *Belgica* wintered in the pack to the west of Graham Island, and drifted nearly as far as Cook's farthest, from the 75th to the 103rd meridian in lat. 70° to 71° 30' S. Over this area there proved to be a continental shelf 270 fathoms below the surface, and to the north an abrupt descent to 800 fathoms.

On this route there is little chance of penetrating the extensive pack in which the *Belgica* wintered, or of making any successful exploration on the western shores of Graham or Alexander Islands, which are likely to be encumbered with pack-ice within the antarctic circle. The continental land indicated by the shelf discovered by the *Belgica* is probably at a great distance to the south, for the isothermal line of 32° air-temperature in summer here comes down as far as 62° S.

Fifth Route.

The eastern shore of Graham Island offers a more easily navigable sea, caused by the ice drifting away from it, as would be the case with all antarctic lands having eastern aspects. It is so far north that it is not necessary to force a way through the main ice-pack before reaching the navigable lane under the lee of the land. In December, 1893, Captain Larsen, of the Norwegian ship *Jason*, got into this lane early in the season, and crossed the antarctic circle as early as the 3rd, reaching his furthest south in 68° 10' S. on the 6th. The pack was drifted to some miles from the coast, which consisted of a lofty ice-foot with high mountains above. But several deep fjords penetrated into the land through the ice-foot, where seals and king-penguins were abundant. Captain Larsen was stopped by pack-ice, and there would be little object in penetrating further, because when the south end of Graham Island was reached, the main pack would be encountered. In this part of the Antarctic Regions there is probably an ocean of vast extent.

Sixth Route.

The so-called Weddell Sea, which Weddell himself named King George IV. Sea, was a temporary opening in the pack during February, 1823, in this quadrant, to the east of Dirk Gherritz archipelago. Captain Weddell, in the brig *Jane*, of 160 tons, left the South Orkneys on his voyage to the south in the middle of January. He encountered many large icebergs between February 7 and 15, but on the 18th, in 72° 38′ S., not a particle of ice was to be seen. On the 20th he was in 74° 15′ S., with only three bergs in sight, but many whales and innumerable birds. There was a fresh southerly breeze, so he returned. The longitude was 30° E.

This was a very remarkable voyage, for, though so far south, Weddell had not yet reached the edge of the pack. It was probably not far off, and would drift up during the last days of February and beginning of March with a south wind. There was no appearance of land, the numerous birds being signs of any open water, and not necessarily of water near land. Weddell's open water was the open water found near the edge of the pack, and had not the same cause for its existence as the navigable sea on the eastern side of Victoria Land, or as the lane of water to the east of Graham Island. There was just as little reason to suppose there was land to the westward of Weddell's position in 74° 15′, nearer than Graham Island, as there was to suppose its existence in any other part of his course south, where it is known not to exist. A little to the eastward Ross found the deepest part of the ocean —4000 fathoms.

The voyage of Weddell is exceptional. When Dumont d'Urville crossed his track, the ice-pack stopped him in 64° S. Ross, in 1843, found a continuous line of pack from Louis Philippe Island eastward, with heavy floes very closely pressed together. It was drifting fast to the north in January. Ross examined hundreds of miles of the pack edge without finding a single opening. He crossed Weddell's track in 65° 13′ S., finding a dense impenetrable pack. Sir Joseph Hooker was inclined to think that this pack was not the result of a summer northward drift of the winter ice; it was too dense for that, and there was never a trace of water-sky over it. His opinion is that, where there are vast areas of landless ocean, the pack moves over it, blocking up wide spaces for indefinite periods. But whether the main pack is found in 64° S. or to the south of 74° S., it is certainly of immense extent in this part of the Antarctic Regions, and a vessel must force her way through it before any of the important exploratory results can be attained. This would take an indefinite time, with the danger of long detention. So that the Weddell route offers the minimum of results with the maximum of risk.

IV. Enderby Quadrant.

Seventh Route.

The Enderby Quadrant extends from the meridian of Greenwich to 90° E., and the circle is thus completed. Here the isotherm of 32° Fahr. air-temperature, in summer, reaches to 54° S., indicating an extensive mass of frozen land in the centre of the quadrant. The northern face of this land was discovered by Captain Biscoe in 1831. The land seen a year or two afterwards by Captain Kemp, a little to the eastward, was no doubt a continuation of the same land. In 1831 Captain Biscoe followed the edge of the pack, near the antarctic circle, encountering very severe weather during the month of February. The wind was strong, with snow-squalls, and he found himself in heavy seas amongst innumerable icebergs. On the 25th, when in 58° E., Biscoe sighted land at a considerable distance, but there was a closely packed mass of ice intervening. He made out lofty cliffs with a perfectly smooth surface; and says that "the cliffs bore the marks of icebergs having been broken from off them, as the bergs were exactly similar to the cliffs in every respect." The range of ice-cliffs was traced for many miles from the foretop, with a good telescope. This was on February 25. On the 27th land was again clearly distinguished, and the black peaks of mountains showed through the snow. It was named Enderby Land.

Here we have a long line of ice-cliffs forming the northern face of an extensive land, and flanked to the eastward by high mountains, as in Victoria Land.

The eastern third of the Enderby Quadrant, to the east of the land discovered by Biscoe, was visited by the *Challenger* in 1873. She met with dense pack in 65° 42′ S. and 79° 49′ E. on February 19. The antarctic circle was crossed in 78° 22′ E., and the ship followed the western edge of the pack for 150 miles, proceeding eastward to within 15 miles of Wilkes's supposed "Termination Island." The soundings in the sea traversed by the *Challenger* gave a depth of from 1250 to 1975 fathoms. Westward of 80° E. very few icebergs were met with, but eastward of 92° E. they were very numerous. Their absence between 70° and 80° E., except close to the pack edge, was so marked that, coupled with their absence on the same meridians in lower latitudes, the conclusion was arrived at that there could be no land for a considerable distance to the south between 70° and 80° E., and that a high latitude could be reached in that direction between Enderby Land and Victoria Land.

Here, then, there appears to be an admirable route for successful exploration, with an open pack, a sea little encumbered by icebergs, and probably navigable water along the eastern coast of Enderby Land. It is the route selected for the German expedition, I believe under the

advice of Dr. Neumayer. The intention is, if possible, to winter on the west coast of Victoria Land, and to send travelling-parties to penetrate as far as Gauss's magnetic position. From these winter quarters there may be valuable co-operation with the English expedition wintering in Wood Bay or McMurdo Bay, both with regard to the magnetic observations and in other respects. No better route could be selected, and we must wish our German colleagues all possible success—a success which their careful organization, their close attention to details, and their wise and well-considered arrangements so well deserve.

For the English expedition the route must be selected which offers the best opportunities for securing the desired results within the time; it should be the route which leaves least to chance or to unknown conditions, and the one by which the least amount of risk is run. It is also desirable that it should be the one which is most favourably situated for co-operation with our German colleagues, and most conveniently placed with reference to the magnetic base, and to a head-quarters whence succour could be sent.

That route will lead to success. It is a matter of grave moment that no mistake should be made.

A SURVEY IN BAFFINLAND, WITH A SHORT DESCRIPTION OF THE COUNTRY.*

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THE following paper will give an account of a survey of part of the southern coast of Baffinland, and of an exploration into the interior of that great island in 1897, both of which are shown on the accompanying map. The sending out of the steamship *Diana* by the Government of Canada in that year, to make further investigations as to the navigation of Hudson strait, afforded the Geological Survey of the Dominion an opportunity for two parties to go at the same time to examine the rocks and make topographical surveys on both sides of the strait.

The writer was placed in charge of the work on the north or Baffinland side, and Mr. A. P. Low of that on the opposite shore. We were provided with small yachts, 35 feet long, well built, and good sailers, but incapable of resisting ice-pressure. They had each a comfortable little cabin, a coal-oil stove for cooking, and accommodation forward for four seamen. The yachts, and a boat for each, were carried to the strait, at some inconvenience, on the deck of the *Diana*, and launched on the

* Map, p. 120. All names which had been given to localities in the area covered by this map are retained. The additional ones have been given by Dr. Bell as necessary for the purpose of description.

arrival of the ship at our respective destinations. Each took 3½ tons of pig-iron as ballast, and we found room to stow away enough of provisions, petroleum, camping outfit, clothing, ammunition, etc., to last for a year in case of necessity.

The *Diana*, a Newfoundland sealing steamer, with a total company of forty-three persons, left Halifax, Nova Scotia, on June 3, and, going by way of the west coast of Newfoundland, passed through the straits of Belle Isle three days later without delay, but when off Hamilton inlet, we became surrounded by a wide field of ice, and lost about ten days before we got free again. On June 22 we reached the entrance of Hudson strait, and found the sea thereabouts all clear of ice. In steaming up the strait, however, we kept too close to the north shore, and got caught in drifting ice at Big island, which stands boldly out from the mainland, and is exposed to the full force of the ice-floe along the shore. After having been unpleasantly jammed for some time at this place, we got away and steamed, without difficulty, into Hudson bay, which we reached on July 12.

The programme laid down for the *Diana* by the Department of Marine and Fisheries required her to make a voyage completely through the strait as soon as she should arrive there, then to land the Geological Survey parties; after which she was to make occasional voyages between Hudson bay and the Atlantic. In the course of one of these trips she was to pick up the geologists and their men and convey them to St. John's, Newfoundland, and then return again and navigate the strait till as late a date as possible.

My yacht and stores were put off the ship at Ashe inlet, Big island, on July 20, and it was arranged that she should call for me again at the same place on September 10. In the mean time, I proposed to examine and map as much as possible of the coast, and, if time permitted, I intended to do some exploring in the interior. I had already made several voyages through Hudson strait, one by the Hudson's Bay Company's barque *Ocean Nymph* in 1880, and the others by the expeditionary steamers *Neptune* and *Alert* in 1884 and 1885, so that I was already tolerably familiar with the landmarks and the character of the strait. If a chart had existed by which it might have been possible to recognize with certainty any point about the entrance to Fox basin, I could have met the ship there, and so have saved a long return journey in my yacht, but the above inlet was the only locality sufficiently well fixed to make a sure rendezvous.

My main object was to investigate and bring away a record of the geology of the coast, and this required a topographical survey of some sort to give it a permanent value. On account of the great distance to be traversed, the intricacies of the coast, the swiftness of the tidal currents, the dangers and interruptions from running ice and other difficulties which we encountered, I soon found that it would be impossible

to undertake an exact instrumental survey of the coast in the time at my disposal. I therefore determined to make what we call a track-survey, which means the mapping of the geographical features by the best method available. In this case the track-survey consisted of a rough triangulation by approximate bases measured by our progress in a given time, with many intersections of courses, and by constantly taking bearings and estimating distances to all points in sight. These formed the basis of diagrams, drawn to a scale, of section after section of the coast and islands as we went along. The more detailed contours of the shorelines, the positions of islands, etc., were often sketched with the aid of compass-bearings from the tops of hills overlooking the sea. A large number of positions were fixed by means of many observations for latitude, and of numerous others for longitude. On putting the results together, it was found that the diagrams required to be only slightly adjusted in most cases, in order to correspond with the positions thus established, so that the accompanying map, reduced from a compilation on a large scale, is a fairly accurate representation of about 200 miles of the southern coast of Baffinland, both as to distance and correctness of position throughout. Charles island and a portion of the south shore of the strait, shown on the accompanying map, were sketched partly from the *Diana*, whose rate of steaming was known, and partly from excursions by land and row-boat, all aided by numerous bearings, while the *Diana* was in these parts, before landing me at Ashe inlet. The general position was fixed from astronomical observations by Captain Whiteley of the *Diana*.

I had no assistant, and the duties of a geological surveyor on an undertaking like the present one were of a varied character, consisting, among other things, of a general superintendence of the sailing of the craft; judging what was best to be done under the constantly changing conditions, by watching the wind, tide, currents, etc.; making the track-survey by the above methods; taking observations for latitude, longitude and magnetic variation; making tidal observations, notes on the topography, on the dip or strike and character of the rocks, on glacial phenomena; taking the heights of mountains, waterfalls, etc.; photographing; collecting, preserving, and packing geological, botanical, and zoological specimens, etc. On land journeys, other labours were necessary in order to make good progress. I had an intelligent native guide, who understood some English, and every spare moment on the yacht was utilized in constructing a vocabulary of the Eskimo language, which I was afterwards able to check by the help of an educated young half-breed belonging to the same people. In doing this, I had an English dictionary before me, and I selected all the more important words in their proper order.

As most persons know little about Baffinland, it will be desirable to give a short general description of the country before mentioning the

results of my own investigations. Baffinland is a large island on the west side of Baffin bay, or opposite to Greenland. It stretches from Hudson strait, north-westwards through twelve degrees of latitude, or from 61° 40′ to 74° N. It is the third largest island in the world, being only exceeded by Greenland and Australia. Its total length is 1005 English statute miles, and its breadth varies from 200 to 500 miles, the average being 305. The area is, therefore, about 300,000 square miles, or about ten times that of Scotland or Ireland. It forms, however, only about one-tenth of the superficies of the Dominion of Canada. Notwithstanding its immense extent, it appears to be of no great value, since it is composed, as far as we know, of barren rocks, partly covered with ice.

It was formerly supposed to consist of a number of separate islands, called Cockburn island, Baffin's island, Cumberland island, Fox Land, Meta Incognita, Sussex island, etc., but it has been pretty satisfactorily ascertained that these are all united, and form the great island now known as Baffinland. The south-eastern part was discovered by Sir Martin Frobisher in 1576, and in 1578 it was named Meta Incognita by Queen Elizabeth. Captain John Davis discovered the land around Cumberland sound in 1585, and Captain William Baffin found the northern part of the island in 1616. The present designation is not new, for in 1821, Sir W. E. Parry proposed it for all the northern part, in honour of Captain Baffin, who was regarded as an able and enterprising navigator. From the above-mentioned dates, it will be seen that all these lands formed part of the British possessions on this continent, by right of discovery, dating from 183 to 143 years before our acquisition of Canada. They were formally transferred to the Dominion, along with all other islands lying north of the mainland of America, by an Imperial order in council on September 1, 1880. These circumstances give us a good enough title, so that it was not necessary to "raise the flag" to assert that they belonged to the Empire, as was done on the occasion of the visit of the *Diana* to Cumberland sound in 1897.

Baffinland has a generally bleak, mountainous, and barren aspect; but on the west side there is an extensive low and comparatively level area, underlaid by horizontal Silurian limestones, stretching inland from Fox basin to the great lakes of the interior. A similar area, underlaid by the same kind of rocks, occurs at the northern extremity of the island. Dr. Franz Boas spent the years 1883–84 in Baffinland, and in winter he travelled extensively by dog-sleigh all along its north-eastern side. We are indebted for most of what we know of these parts to his observations and maps, published in 1885.* According

* Dr. A. Petermann's 'Mitteilungen aus Justus Perthes Geographischen Anstalt, Ergänzungsheft,' Nr. 80. Gotha, 1885.

to these, the mountains form three principal ranges, all trending north-west, or parallel to the longer measurement of the island. The highest runs along the north-east coast, facing Baffin bay; the middle range is between Cumberland and Frobisher sounds, while the third, or southern one, extends along the north-east side of Hudson strait from Resolution island to Fox basin.

Northward of Cumberland sound, the broad north-eastern range forms a great plateau from 5000 to perhaps 8000 feet in height, covered with a cap of ice, resembling the similar covering of Greenland, while the valleys in the remainder of the range to the northward (probably not quite so high) are filled with ice, which, in some cases, descends as glaciers to the sea. The higher parts of the middle range may be from 2000 to 3000 feet above the sea. The southern range, as far as it can be seen from Hudson strait, appears to be from 1000 to 2000 feet high. The actual measurements which I made of some of the hills of this range were confined to the middle portions, where they are lowest, the highest parts being towards both the south-eastern and north-western extremities.

The summit of that part of the southern range lying between Hudson strait and Frobisher bay is covered by a long smooth-topped cap of ice, forming the Grinnell glacier. The dimensions of this glacier are not accurately known, but the length is somewhere between 70 and 100 miles, and the breadth may be about 20 miles. The Eskimo call it Ow-u-i-ta. The charts, which are very imperfect, represent it as discharging into several of the inlets on the south-west side of Frobisher bay. The Eskimo described to me one discharge of this kind, called Pakaluia, not far to the north-westward of Gabriel strait, and they stated that the bergs that float up the north side of Hudson strait, and which are all small, come from this locality.

In connection with the existence of this great glacier in the extreme south of Baffinland, the question may be asked, why there are no glaciers further up Hudson strait, on Southampton island, or in any part of the Labrador peninsula. This fact is probably owing partly to great local differences in the amount of precipitation, and, in the case of the northern portion of Labrador, to the circumstance that the mountain range near the sea is too narrow and steep to retain even the relatively small quantity of snow which falls upon it. Further inland the country is much lower, and is mostly wooded. Throughout the northern part of the Labrador peninsula there appears to be less snow than in the regions further south, and consequently the material is not present for the creation of glaciers. In these latitudes, the amount of snowfall is, no doubt, largely influenced by the temperature of the adjacent sea during winter. The ocean current, impinging on the east coast of Greenland, flows around its southern extremity and up the west coast; then it crosses to the Baffinland side, and a part of it finds its way up

the north shore of Hudson strait, and this crosses to the south side, in the western part, and flows out along the southern side, where the current appears to run constantly eastward. On the northern side of the strait, at each tide, the current flows longer to the west than to the east. This is easily seen by the movements of the small icebergs which occasionally pass up on this side. In Greenland, the high land, together with the ocean current, having some degree of warmth, which has just been mentioned as flowing round the southern part of the great island, afford very favourable conditions for the accumulation of its enormous glacier. The same current, passing down the eastern coast of Baffinland and around its southern extremity, furnishes the necessary marine conditions, while the extensive high lands adjoining the sea in these parts allow the heavy snows of winter to accumulate. On the other hand, the cold sea surrounding the Labrador peninsula, the dry winter air of the interior, and the moderate elevation of the land, all combine to prevent the formation of glaciers south of Hudson strait.

The country, for a long distance inland from the south side of Hudson strait, is not wooded, except at the bottom of Ungava bay, and consequently driftwood is almost absent from the greater part of this shore. The northern part of the east coast of Labrador is also destitute of timber, and there the ocean current flows south. No trees of any kind grow in Baffinland. The set of the currents in Hudson strait would render it impossible for driftwood, even if present on the south side, to cross to the north shore, yet trunks of small spruce trees are not uncommonly stranded at high-water mark all along the latter. Whence has this wood come? The only answer appears to be that it has been brought by the current, which, after flowing round Cape Farewell and across Baffin bay, passes up this coast. In that case, its original source would probably be in some of the rivers of northern Siberia, from which it would be carried by the current that Dr. Nansen describes as flowing thence across the polar region and on towards Greenland. Some of these small trunks have the long butt due to having grown in alluvial soil, where the tree threw out fresh roots above its original ones, on account of the accumulation of silt around its base. This circumstance also points to the earthy banks of the Siberian streams, rather than the rocks of Labrador, as the birthplace of these trees.

During the Tertiary period, all the land in the north-eastern part of North America is believed to have stood at an elevation of several thousand feet above the present levels. At that time the site of Hudson strait and its continuation, Fox channel, formed a land valley, extending from the south side of Melville peninsula to the Atlantic ocean, a distance of fully 700 English statute miles, with an average breadth of 100 miles or more. It probably contained a great river, which had numerous large branches traversing what is now the bed of Hudson

bay, and converging in its north-eastern part. The bottom of this great inland sea is very level, and in most of its area it is covered by less than 70 fathoms of water. Few soundings have been recorded in Fox basin, and it is likely to prove even shallower than Hudson bay. The submerged valley of Fox channel and Hudson strait deepens as it goes towards the ocean, and gives soundings of 340 fathoms and upwards before intersecting the present line of the Atlantic coast.

After the close of the Tertiary period, the elevated land on either side of Hudson strait became covered with ice. A study of the glacial striæ of these regions shows that in Baffinland, to the north of the great depression, the ice moved southward and fell into it, while to the south, in Labrador and the northern part of the present bed of Hudson bay, it moved northward to the same huge reservoir. The ice from both

TYPICAL VIEW ON SOUTH COAST OF BAFFINLAND.

directions, which thus came together, filled the wide valley and moved eastward or down-grade to the ocean, as shown on either side, by the forms of the glaciated rocks, the directions of the striæ, and the composition of the drift.

Lakes appear to be scattered everywhere among the mountains in southern Baffinland, but there is what may be specially designated a great lake region in the central part of this half of the island. Two of the lakes which occur there are worthy of a short notice. The southernmost, Lake Amadjuak, which I visited, may be 120 miles in length by 40 in breadth in the middle, with an elevation of about 290 feet above the sea. It lies in a north-west and south-east direction, between the southern and middle main ranges of mountains, already described. When I first came in sight of this lake, not far from its central part,

it was bordered on the south-west side by a generally level plain, dotted with hummocks of Laurentian rocks, which also partially surrounded Lake Mingo, 15 miles in diameter, and lying quite close to Lake Amadjuak. Immediately overlooking these plains, the north-eastern side of the southern range rises, rather abruptly, to a height of 700 feet, or 1000 feet above sea-level. From the top of a hill, which I called Mount Mingo, 966 feet, by barometer, above the lake of the same name at its base, some high points, covered with snow, were visible a long way off to the east in the mountains of the middle range on the opposite or north-east side of the big lake.

According to native accounts, Lake Amadjuak discharges northward into Lake Nettilling (which may be 140 miles long and 60 miles broad) by a short river with no rapids, and up which the Eskimo can paddle their kyaks; and Lake Nettilling drains into Fox basin by a large and somewhat rapid river, with a course of 50 to 60 miles, and it must therefore have an average descent of about 5 feet per mile. My guide said the name of this stream was Nowata, but on Dr. Boas' map it is called Koudjuak. Both of these great bodies of water are larger than any lake in the whole peninsula of Labrador, which measures 1000 miles each way, and they may almost be compared to Lake Ontario in extent. The Eskimo informed me that the country is level about the north-western half of Lake Amadjuak and all around Lake Nettilling; also from both these lakes to Fox basin. The name Nettilling means "flat-floor." Reindeer are plentiful in summer on these wide plains, but in winter they go into the mountains. As already mentioned, this level country is no doubt underlaid by horizontal limestone. A corresponding low tract of similar limestone occurs in the eastern part of Melville peninsula, on the opposite side of Fox basin. Mansfield island is formed of flat-lying grey limestones, and these I found to contain fossils of the Niagara formation. Drift fragments of the same kind of limestone coming from the country on the east side of Fox basin, contain fossils of this formation, and I have no doubt the rocks of the two regions are correlated. At the head of Frobisher bay, and on its south-eastern side, is an isolated hill of limestone, shale, and marl belonging to the Trenton or Galena formation of the lower Silurian system. It is called Silliman's Fossil mount, and has afforded over seventy species of fossils, many of them new to palæontology, but, as a whole, they correspond to the Manitoba and Minnesota fauna of this horizon, rather than to that of the Trenton in the Ottawa and St. Lawrence region. Other isolated patches of these rocks and one outlier of the Utica or next higher formation occur in other parts of Frobisher bay.

The general appearance of Baffinland, as viewed from the sea, is mountainous, rugged, bleak, and barren. Bare black-looking rocks are almost everywhere in evidence, both along the coast and on the sides and crests of the mountains. But on going inland in the middle of

summer and looking over the country from a height, this appearance is somewhat relieved by green-bottomed valleys, where grasses and sedges grow among the stones, and also by occasional patches of dwarf vegetation on the hillsides, and here, on a sunny day, we may find many bright arctic flowers of various colours. The general blackness of the rocky landscape is sometimes varied by white spots and long narrow banks of snow on northern slopes sheltered from the sun's rays. Beautiful blue lakes may be seen here and there at different levels among the mountains. The clear brooks and small rivers which discharge the waters of these lakes from one to another, are almost sure to end in fine cascades when they plunge over the last ridge into the head of some inlet or bay. I collected over a hundred different species of plants, and, if time had permitted, probably a good many more might have been found. The general dark appearance of the rocks is due to a growth of lichens on their surface.

Returning to the subject of my own journey in 1897. After the yacht had been launched in Ashe inlet, Big island, on July 20, we were obliged to remain for a day at anchor at the head of the inlet on account of a strong head wind. There was no darkness at that season, and we sailed at two o'clock next morning. We had only gone a few hundred yards, when the sound of a human voice, from a long distance behind, reached us in the calm northern air. We immediately put about and dropped the anchor. With a couple of men, I rowed back in the boat, following up the direction from which the sound was coming. At length we saw a big Eskimo man standing on a rock at the edge of the water, with his gun on his shoulder, but carrying nothing else. As we approached, he greeted us like an old friend, and pointed out the way for us to come to the rock he was upon. As soon as we touched it, he jumped into the boat as if he belonged to the party, and showed great delight in joining us. He had been out hunting till late the previous evening, and had lain down for a nap near our anchorage. The noise we made in getting under way had wakened him up. On reaching the yacht, he was the first to climb on board, and he immediately made himself quite at home with us. He was demonstrative, talkative, and bubbling over with good nature. Unlike an Indian, he was anxious to show us how much English he knew, and I was glad to find he could understand us fairly well. He said he was familiar with the whole coast, and had also travelled in the interior. I told him I was going a long way up the strait, that I might be away two moons, and asked him if he would come with us as guide. He joyfully accepted my offer, and began at once to make himself useful. Towards the middle of the day, the ice blocked our passage so completely that we were obliged to turn back. Our guide, whose name was Twimi, now advised us to go round the eastern extremity of Big island, and said we would find but little ice in the north channel. The evening was beautiful, with a

light fair wind, and as soon as we had rounded the east point, we came upon a large camp of Eskimo. They surrounded us in their kyaks and omiaks and regarded us with the most unaffected friendship, both the men and women shrieking and cheering with delight, like so many children made suddenly happy. I now discovered that Twimi's family, consisting of his father, mother, wife, sister, and several children, were among the party camped here. I told him to go ashore and get what things he might require for his journey, and to rejoin us at some islands which were in sight a few miles off, where I intended to anchor for the night, in order not to be troubled by our new-found friends. He was afraid to quit the yacht, however, in case we might sail away and leave him behind, so he asked a couple of young men to come after us in their kyaks with certain articles which he enumerated. I was glad he had had this chance to communicate with his family, whom he had never mentioned to us. If we had succeeded in passing up the outside of Big island, they would have had no means of knowing what had become of him until he could find them on some of their wanderings after his return.

During our entire cruise we tried to find a harbour every evening, but did not always succeed in doing so, and consequently we spent some anxious nights, watching the movements of the ice and the rushing tides. By constant vigilance we managed to escape any harm, and we brought back our yacht without its having suffered the slightest damage. The whole coast is well supplied with good harbours. In the course of our explorations we discovered twelve, roomy enough for large vessels and affording complete shelter with convenient depths of water and good holding-ground in every instance. Sketch-charts of several of these were made and lines of soundings run, which may be of use some day if Hudson strait should be utilized for navigation to a greater extent than it is at present.

From Big island to Fair Ness, the outer ridge of the southern range skirts the sea-coast. This section is remarkable for six great bands of coarsely crystalline white Laurentian limestone which are here exposed. At 12 miles north-west of the extremity of Big island, a narrow entrance leads into Crooks inlet, which is from 3 to 4 miles wide and extends for 20 miles into the land. Good sections of five of these bands may be seen in this inlet, the bluffs and hills on either side consisting of these rocks together with gneiss in about equal proportions. The dip here and elsewhere along the coast is almost invariably inland or to the north-east. Twelve of these enormous limestone bands, besides numerous smaller ones, were met with between Icy cape and Charkbagh, and I have calculated that their aggregate thickness may amount to the enormous total of 30,000 feet. One of them, which comes to the coast at Wharton harbour, is better exposed than most of the others, and I estimated its thickness at 5700 feet, or upwards of a mile, and yet it

may not be the thickest of these immense bands. The facts I was able to ascertain prove that these limestones extend from the Lake Amadjuak route to the head of North bay, a distance of 130 miles by a breadth of 40 miles, and from their trend it may be inferred that they will continue south-eastward and come out successively to the shore of the strait at different points between North bay and the Middle Savage islands. In no other part of Canada, nor in the United States, has such a volume of these limestones been found. They go far to prove that the newer Laurentian rocks are a sedimentary and not a foliated granite series.

Behind Fair Ness is a bay running back 20 miles from the ness, with a length, parallel to the strait, of 25 miles, which I named Markham bay. It contains many islands and points, and along its north-east

HEAD OF NORTHERN INLET, NORTH BAY, BAFFINLAND.

shore the land is lower than elsewhere on the north side of the strait. The coast is also comparatively low to the northward of Big island. From Markham bay, for 100 miles north-west, the main shore is bordered by an archipelago of islands about 25 miles broad, embracing all sizes, from mere rocks up to 10 miles in length. They seem to be innumerable, and there must be many thousands of them. As a rule, the islands are smaller and more widely scattered towards the outside of the archipelago, and progressively larger, higher, and closer together, as we approach the solid land. In going towards the main shore, it is impossible for a stranger to distinguish the islands from the continuous land. The former become larger and higher, and the channels between them narrower and narrower, until at length they terminate among the hills without connecting to form islands. The condition may be best understood if we imagine a rugged country, like that behind this coast, and

having a general descent to the south, to be continued under the water of the strait till it is half submerged.

My longest journey inland was the one made northward from the head of Amadjuak inlet or fiord, to the shores of Lake Mingo, close to Lake Amadjuak. We found a perfect and easily accessible harbour at the head of the fiord. The Alice river dashes into it by a foaming rapid past the foot of an isolated conical hill. This river forms the connecting links between the various lakes of the chain in a valley leading in the direction we wished to go. Leaving the yacht in charge of two sailors at the harbour, I started on foot with the other two seamen and my Eskimo guide, who said he knew the way to the big lake. After we had gone part of the distance, we found that he had been over the route only by kyak, which he "portaged" between the lakes, and in trying to steer the best course by land, he was sometimes at fault. The men's packs were comparatively light, as we did not expect to be gone more than a week. They contained a tent, blankets, cooking-outfit, and provisions, whilst I carried what instruments were required.

The hills were rugged, steep, and covered with boulders, and we found the best walking along the bottoms or sides of the valleys, especially where these were terraced. But in following the margins of the lakes, it was annoying to find our way occasionally blocked by a precipice, or a bluff with deep water at the foot. This necessitated climbing up high steep hills, and sometimes making a considerable *détour* before we could resume our march in the valley. In some places, on the sides of the valleys and elsewhere, rounded boulders of gneiss were piled in the form of ridges and small hills without any fine material among them. At a few localities I saw good examples of osars, or ridges of sand and gravel without any boulders. Well-marked terraces at various altitudes, up to more than 400 feet above the sea, occurred here and there all along the valley of the Alice river. Marine shells of a few common northern species were found in several localities in the drift of this valley up to an elevation of 110 feet above sea-level. At one place the bouldery clay containing these shells had been disturbed by ice-pressure, showing that here there had been two periods of glaciation. We left the main valley of this river at Stevenson lake, and crossed the hills north-westward to Gilbert lake on one of its branches, a distance of $2\frac{1}{2}$ miles.

All the streams flowed towards Hudson strait till we came near to Winchell lake, when they began to run northward in the direction of Lake Amadjuak. The last body of water before reaching Lake Mingo, and which I called Walcott lake, lay directly across our course. It has an elevation of 243 feet, by barometer, above Lake Mingo, and nearly the whole of this descent is in a single cascade at its outlet, which falls directly from a notch at the level of its surface and at right angles to its straight northern side. We were obliged to go round to

the east end of this lake, and from it we crossed the high rocky hills to the northward. At the top of the one which I called Mount Mingo we obtained a fine view over Lake Amadjuak, on which no white man had ever before gazed. On descending to the shore of Lake Mingo, which lay at its foot, carrying with me two good barometers, I found the height of the mountain to be 666 feet. By a comparison of elevations, that of Lake Mingo would be about 300 feet above the sea, and the mountain would therefore be 966 feet above the same level. Lake Amadjuak was estimated to be about 10 feet lower than Lake Mingo. From the top of Mount Mingo I took several photographs, giving a panoramic view of the lakes and the plain between them. The north-east side of Lake Amadjuak could be seen in the dim distance, and I estimated its width to be at least 40 miles, and it may be considerably greater.

In our weary walk along the stony margins of the chain of lakes which we followed, varied by *détours* over the high rocky hills in order to reach Lake Amadjuak, I could not help wishing for a canoe, by which the journey would have been accomplished with greater ease and in less time. Travelling by this means, only about six rather short portages, and one of 2½ miles, would require to be made, as may be seen by the accompanying map, in order to go from Amadjuak harbour to the lake of the same name.

On our return journey, we took a more western route from McGee lake to Greeley lake than the one we followed in going, and thus we passed by several lakes we had not before seen; but the general character of all these sheets of water is much the same. The banks are sloping and covered with stones and boulders, having a growth of coarse grass among them, while craggy mountains rise everywhere just behind. The heights of the principal ones we passed over on either side of the Alice river varied from 1050 to 1150 feet above the sea.

In two of the valleys we crossed I saw miniature glaciers, but in each case they had evidently been formed by the continued freezing of the overflow of a stream choked by the frost, so that in the course of the winter, or perhaps of several winters, a great accumulation of ice had taken place. In summer these streams had cut canyons completely through the ice, and were flowing among the boulders underneath it.

An interesting feature in the physiography of this region was the great number of sparkling rills of the clearest water which crossed our path along the sides of the valleys. Sometimes, for miles, we would pass one of these rivulets at every few hundreds of yards. They ran down the slopes in trenches or little channels cut in the drift with a regular flow, gurgling over clean red, white, and grey pebbles and cobble stones, and tempted the perspiring traveller to

drink the ice-cold water oftener than was good for him. The source of all this water seemed to me to be from the steady thawing of the deeply frozen ground, or of the ice among the drift on the higher levels during the summer weather.

I took the temperature of six of the lakes we visited by a tested Cary thermometer, with the following result: Orton lake, August 11, 50° Fahr.; Walcott lake, 14th, 51°; Lake Mingo, 14th, 48°; Merriam lake, 17th, 50°; a bouldery lagoon off Greeley lake, 17th, 58°; Gertrude lake, 18th, 50°. The high temperature in the lagoon, which was at the mouth of Boulder river, was due to the fact that the water, for some distance above it, spread among a wide and even field of boulders, all of which became heated in the sun, and so warmed the water, and also to its exposure in the quiet shallow lagoon itself. We happened to halt for our mid-day meal at this place, and while it was being prepared, I took off my clothes and plunged in for a bath, to the great delight of the Eskimo Twimi, who had never before seen a human being swimming. The whiteness of my skin and the frog-like movement of my body interested him immensely, and he inspected me with child-like glee, first from the top of one big boulder and then from another.

Our method of cooking will interest any one who may contemplate a trip like ours in any similar subarctic region. At our first camping-place, the two sailors and I went off to collect any dead stems we could find of the root-like or creeping dwarf willows, in order to make a small fire to boil our kettle. On our return, Twimi said they were no good. He had in the mean time built a little chimney of stones, taking advantage of an angle in the rocks, and after collecting an armful of the large growing tufts of a heath-like plant, very common everywhere in these parts (*Cassiope tetragona*), he made them burn in his chimney, sending a strong flame out at the top. By feeding it in as rapidly as it consumed, from a heap with which we supplied him, he soon made our kettle boil at the top of the chimney. A knowledge of the fact that this plant may be thus utilized in a green state, in fine weather at any rate, may save travellers carrying an unnecessary quantity of alcohol as fuel. There is a slight objection to its use, from the fact that a sticky gum from its smoke condenses on the outside of your kettle or pan.

We got back to the yacht on the eighth day after leaving, or on August 18, having spent four days in going, one day round Lake Mingo and three days in returning. Two days were rainy and six were fine, and during the latter both mosquitoes and black flies were very troublesome. Lake Amadjuak proved to be about 50 miles from our harbour. My record of distances was kept principally by pacing and time estimate, but four latitudes were also taken by sextant. I obtained a considerable number of photographs on gelatine films, which served to illustrate all phases of the scenery.

On my return to Amadjuak harbour, I found the fiord nearly clear of ice, and we left immediately to resume the survey of the coast to the north-west. We reached Charkbagh fiord, said to be the longest inlet on the north side of Hudson strait, on August 22, and I judged it best to turn back the next day in order to be reasonably sure of keeping my appointment to meet the *Diana* at Ashe inlet, on September 10. On the way back I made a track-survey among the islands lying outside of those we had been among going up the strait, and we anchored again in Ashe inlet on September 1. During the interval between this date and the 10th, I surveyed North bay nearly to Icy cape, and returned to the inlet in time for the *Diana*, which sailed with us for St. John's, Newfoundland, on September 12.

LOOKING UP CANYON INLET, BAFFINLAND.

Our general experience during this yachting cruise on the southern coast of Baffinland may deserve a passing notice. As a rule, the weather was fine—too fine, perhaps, as there was much dead calm, which hindered our progress. It, however, also included fogs, high winds (sometimes amounting to gales), rains, and some decidedly cold spells. Although on calm, sunny days we found the weather quite warm inland, on the sea there was a constant feeling of cold or rawness and discomfort, on account of the presence of so much ice.

The tides in Hudson strait are very high, being fully 30 feet at Big island, and considerably more at the head of Ungava bay; but at the entrance of Hudson bay they become, all at once, very moderate, owing to the pent-up water being relieved by the sudden expansion into Hudson bay to the south, and Fox bay to the north. Near the shore the difficulties incident to the great rise and fall of the water

are increased by the velocity and uncertainty of the currents generated by the high tides. The different depths and directions of the channels among the islands and the irregularities of the coast give rise to cross-currents running to all points of the compass, races, tide-rips, and a very rough sea when much wind is blowing. The time over which my experience extended was so short that it did not enable me to find the hour of high and low water. The sluggishness of the common compasses, which were all we had, and the great amount of the declination, varying from 57° to 64°, caused much inconvenience, both in navigating and in making the track-survey. Our difficulties with the ice, as well as the tidal currents, apply, of course, only to the coast, and do not in any way bear upon the question of the navigation of the main strait by large vessels. At the same time that the whole width of the strait outside of the islands is quite clear, the ice may be lodged here and there in the fiords and among the islands all along the north shore. In sailing in a small craft in these parts, the swift currents, just referred to, bring the ice down upon you in the most extraordinary manner. The ice-pans appear to drift capriciously backward and forward, and, without any apparent cause, they will select some unexpected course and insinuate themselves into an open bay, harbour, or channel. You may be comfortably anchored for the night, and congratulating yourself on your good luck, when you will see a pan of ice gliding rapidly into your harbour, soon followed by another, and this by many more, until, in less than an hour, your snug shelter is filled up and you are a prisoner, in danger of being pushed upon the rocks. With very little wind, you may be barely keeping ahead of an ice-field following you up, when all at once you see another coming across from one side to intercept your course. You turn to avoid it, and soon meet a third, running from some other direction. Sometimes it is a race between you and a grinding field of ice to reach a gap, by which you hope to escape into open water beyond, before the narrow space is blocked up.

Little is known of the fish of Baffinland. As before mentioned, the cod is said by the Eskimo to abound in Frobisher bay, as it does around Cape Chidley, and Dr. Boas mentions a place much further north, to which the natives resort to live upon this fish for a certain period. The cod also occurs in Hudson bay, as proved by myself in 1877 and by Mr. Low in 1899. In 1880, I found a small halibut floating on the surface in the straits. Sea-trout enter the mouths of nearly all the streams, and we saw speckled trout jumping in the lakes of the interior, but salmon do not seem to frequent the north side of the strait. In 1884, I dredged in from 20 to 40 fathoms at Big island, and found pretty much the same aggregation of crustaceans, mullusks, and radiates as we get at corresponding depths in the gulf of St. Lawrence. Several species of marine mammals, some common and some rare, are to be

found on the north side of Hudson strait, among them being the walrus, the narwhal, and the polar bear, the Greenland whale, the bottle-nose, the fin-back, and the little white whale, besides two or three other cetaceans. The seals of this coast include the bearded or square flipper, the Greenland or harp, the fœtid or ring seal, and the harbour seal, and other species are said to be taken occasionally.

The terrestrial mammals of Baffinland are confined to a few species, among them the reindeer, of which single individuals were seen everywhere we went; but the greater number of these animals move about in herds, and are found in different districts at different seasons. The other mammals are the arctic hare, the wolf, the white and the blue fox. The red fox and its varieties are not found in Baffinland, although common on the south side of the strait. We sometimes saw a mouse or mole darting from the shelter of one rock to that of another, and it is probable that the foxes subsist mainly on these; but I saw no evidence of the existence here of the large yellow-cheeked meadow mouse, which is abundant on the west side of Hudson bay. Some of the Eskimo we met knew about the musk-ox, and said it lived in the northern part of the island. Of the few birds we saw in the interior, ravens, arctic loons, rock-ptarmigans, and snow-birds were the most frequent. The black guillemot was common, and the least auk rare on the coast. The trumpeter swan and the common eider breed on Nottingham island. At Charkbagh I saw two large flocks of Canada geese flying due south on the night of August 22, but this bird was not seen further east.

Although the air was always cold on the water, by going a few miles inland, on a bright day, one found quite a different atmosphere, and the comforting sense of warmth in the pure air was quite exhilarating. If calm, the flickering appearance of the heat over the rocks was more manifest than in the regions further south. In the bright sunshine the arctic flowers of many hues would be all wide open, and little butterflies of various different species could be seen flitting about in considerable numbers, making the most of their brief time for enjoyment. Of all insects, the lepidoptera were most in evidence, and I collected fifteen different species. Besides these, black flies, mosquitoes, and two species of bumble-bees were the only insects noticed. On such excursions one missed the elsewhere familiar grasshoppers and crickets, dragon-flies, beetles, ants, and other insects. It is an interesting fact that Mingo, the name of one of the large lakes, means "ant," and it is possible that ants may be found on the plains around this lake, which is far away from the cold sea-air. In the lakes and streams, no larvæ of insects, no shells, no crayfish or frogs or newts, are to be seen, and on the land there are no toads, snails, slugs, or spiders.

The absence of birds of prey, swallows, singing birds, and squirrels

is also noticeable, and contributes to the feeling of solitude one experiences in this treeless region.

The Eskimo are not numerous in Baffinland. From what I could see and learn in 1897, the total native population of the south coast and southern interior is only about 170, while that of the west or Fox basin side may amount to one hundred more. The bulk of the population on the eastern side of the island has gathered at the two whaling stations of Kekerten and Black Lead in Cumberland sound, where many of them are employed. According to the report of the commander of the *Diana*, they numbered about 400 in 1897. This would give a total population of about 670 for the whole of Baffinland.

ESKIMO KAYAKING NEAR AMADJUAK BAY, BAFFINLAND.

The old tradition that the Eskimo are a people of small stature still obtains in some quarters, but is without foundation. On the contrary, in Labrador, Baffinland, and all around Hudson bay, the height of the men is probably above, rather than below, the average of the human race; but, as a rule, the women, although very strong, are considerably shorter than the men. We always found these people honest, cheerful, frank, and friendly. They are brave, industrious, provident, and communicative, in all of which characteristics they contrast with the northern tribes of Indians. Their skins are often greasy or dirty, because it is difficult to have them otherwise in cold weather and in the absence of soap or warm water or anything to serve as a towel, and because, for ages, custom and good form never required anything else; but wherever they have been shown the use of soap and can obtain it, nothing pleases them more than to wash themselves.

They eat most of their flesh, fowl, blubber, and fish in the raw state, not from choice, but necessity, for they can seldom obtain either vessels or fire for cooking. But when they own a kettle or pan and can procure wood, they cook their meat, and enjoy it much more in this form. At the end of our explorations, when I had paid Twimi (in hardware, ammunition, etc.) for his services, and we were about to steam away in the *Diana*, he thanked me for having paid him so much, but more especially for the bountiful meals of hot cooked food we had given him every day while he had been with us.

Before the reading of the papers,* the PRESIDENT said: This Society is so closely connected with the Antarctic Expedition that I will read a telegram which has just arrived from Dr. Nansen: "The Conference of the International Investigation of the Sea, now meeting in Christiania, expresses its goodwill towards the British Antarctic Expedition, and sends best wishes for its success.—NANSEN, President."

We have two papers this evening relating to the very northern part of North America, one by Dr. Bell, who is well known to us, who has just succeeded our gold medallist, Dr. George Dawson, as director of the Geological Survey of Canada, and the other by his nephew, an extremely promising geographer and geologist, Mr. Bell. Dr. Bell's paper is on the south part of that great island, Baffin island, the great mass of land opposite Greenland on the western side of Davis strait and Baffin bay. The other paper is on the region so well known to us as having been traversed by Sir John Franklin and others, the country between Great Bear lake and the Arctic ocean on the northern coast of North America. I regret that both the authors are absent. We had hoped that Mr. Bell would have been here, but he was telegraphed to, to return to Canada, and therefore I will read you an abstract of the papers.

After the reading of the papers, the following discussion took place:—

Mr. J. G. COLMER: You have asked me to address the meeting, but your request has come upon me rather suddenly. I did not know that I should be called upon to speak at all, and I rise naturally with some diffidence, because I know nothing personally of the region about which we have heard such interesting matter this evening. But I am not ashamed to make that statement, because we all know Canada is a very large country. I have been over a good deal of it myself, but I have never had the good fortune to visit those far northern regions which Dr. Bell and his nephew have described. I have read about them from time to time, but although I have not been there, I have the pleasure of knowing Dr. Bell very well, and also his nephew, and many other members of the Canadian Geological Survey to which they belong; and am aware also, as are many members of the Geographical Society, of the very valuable services they have done in exploring the less accessible parts of Canada. Their reports are published annually, and are looked forward to with very great interest, and to my own knowledge several very interesting papers have been read in this hall from time to time about many parts of Canada with which we are not many of us very familiar. I cannot speak of the Geological Survey of Canada without mentioning the name of one who was well known to us, Dr. Dawson, and whose recent death is a loss to geographical science all over the world. Like many others, I came here to-night to obtain information rather than impart it. I think I shall be expressing the feeling

* A paper by Mr. Mackintosh Bell on Exploration in the Great Bear lake region was read at the same meeting; it will be published shortly.

of the meeting when I say we have all been very interested in the papers by Dr. Bell and Mr. Mackintosh Bell, illustrated as they have been by the admirable photographs; and I am sure Dr. Bell and Mr. Bell will be highly gratified by the reception accorded to their papers. Papers of this kind make us understand practically how little we know after all of the vast territory which makes up the Dominion of Canada. At the present time, although we have a population which the present census will probably show is somewhat in the neighbourhood of six millions, we may say that even yet only a very small fringe of the country is inhabited. There are immense territories which are only partially explored, and we are learning year by year of the riches of Canada and of the various sources of wealth with which the different parts of the country have been endowed. Naturally the principal industry of the country at the present time is agriculture, but we are daily finding new riches in the way of minerals and other resources; and it is a very curious thing that, although we hear from time to time of lands in remote portions of Canada which are described as inhospitable and barren, we are apt to be surprised when in a few years the discovery of gold or some other form of wealth has led to thousands of people congregating in these particular regions. The discoveries in the Yukon and the Klondike districts may be mentioned as instances. I am sure we have all listened with very great interest to the papers we have heard to-night, and I am only sorry that I cannot say more from personal knowledge of the particular districts which have been discussed.

Colonel CHURCH: I scarcely anticipated being called on, from my special field of South America, to speak on the northern part of North America; but I may be able to point out one or two things of special interest. I am greatly pleased to find attention drawn to this region, and more especially by an old friend of mine —Dr. Bell. Year after year Canada pushes her explorations to the north, and with great profit to science and to her own prosperity. If we look at the development which has taken place in Canada, it is surprising to find that it has been almost confined to the southern fringe of the country. Canada seems to be sailing like a badly laden ship—all on one side. The great heart of the country has yet to be touched, and in that great heart, I believe, will be found riches more vast than in any part that has yet been developed in the Dominion. Exploration has been made with a view to reaching Hudson bay from Europe by way of Hudson strait, but it is as yet, I believe, doubtful whether useful navigation can take place there. However, the province of Quebec—and I am subject to correction by those gentlemen who are more familiar with Canada than I am—is now making efforts to reach Hudson bay by rail, and I understand they have before the Government to-day an application for a privilege to run a railway northward, and then to make a little branch to the southern end of Hudson bay, where they can reach about 20 feet of water for several months of the year. The immense wealth, however scattered it may be, can then be taken out to Quebec. Then, if we move westward along the Laurentian range of hills, we find a great forest of spruce and trees of that nature, which is rapidly being cut for the purposes of building and for pulp manufacturing, and a great many mills are being established along that line. All that range, about 1500 miles in extent, is covered by a great wooded belt, and I think has also been found to promise to be very rich in minerals, especially copper and mineral phosphates, and perhaps other minerals of value. At the same time, instead of its being a country lacking in agricultural possibilities, it has also been found, even on the Hudson bay slope, to be very rich in agricultural land here and there. But going west and tapping the very heart of the Dominion north-west of Lake Winnipeg, to Fort Simpson on the Pacific coast, we shall find, perhaps, as fine a wheat-field as there is in the world. I may say it amused me two

years ago at Dover to hear Sir William Crookes starving us to death in the matter of wheat, when there are at least 200,000 square miles of wheat lands west of Lake Winnipeg with a climate better than on the frontier of the United States, and where the snow does not fall so deep, and the prairies are exceedingly rich and fertile. The climatic conditions of north-west Canada are largely due to the Japanese current. It is the northern deflection of the most powerful oceanic river of the world—the equatorial current, which daily moves, from east to west, several tens of thousands of cubic miles of warm water. When it reaches the island district south-east of Asia, it divides and sends a greater part of its vast volume northward. This skirts the Japan coast, where it is known as the Kuro-Sivo current. It then turns eastward, runs south of the Aleutian islands, impinges against the shores of Alaska, and continues south-east along the coast of California. The soft winds which sweep over it cross the Rocky mountains where they are low, and, pouring into the region north-west of Lake Winnipeg, give it a warmer climate than is found on the western section of the Canadian Pacific railway, 5° of latitude further south. In fact, in 56° N. lat. in the Peace river valley, and also at Pori Simpson on the Pacific coast of British Columbia, the climate is not so severe as at Montreal, and at the above port strawberries ripen in June in the open air. The Rocky mountains abreast of Port Simpson have passes under 2500 feet elevation above sea-level, while further south they increase in altitude, and the Canadian Pacific railway has to cross them at about 5000 feet elevation, their general altitude being such that they interrupt the passage of the warm winds from the ocean. It is perhaps worthy of remark that the shortest line that can be drawn, north of the Gulf of Mexico, between an Atlantic port and a Pacific one, is from Quebec to Port Simpson, and that the distance from Liverpool to Yokohama or Shanghai, taking this route, is 800 statute miles shorter than any existing one. Broad statesmanship might regard this fact as presenting a good opportunity for a British answer to the Trans-Siberian railway.

The PRESIDENT: We have now merely to thank the authors of these two papers. And, turning to a purely geographical point, I would mention that Dr. Bell has not communicated a paper to us for the first time. I think it was almost twenty years ago that he gave us a most interesting paper on the capability of the navigation of Hudson bay, and more recently he was here himself and read a paper on the country south of James bay. I think there are few men in Canada who have done so much and laboured so hard as Dr. Bell has for the development of that country. Almost every year we have interesting papers from him in the publications of the Canadian Geological Survey, and I am now glad to congratulate him on his appointment as Director of the Geological Survey of Canada. We all regret very deeply the loss of our gold medallist, Dr. Dawson. I would also point out that, although Dr. Bell has given us this interesting account of the southern part of Baffinland, there is an enormous extent of country absolutely unknown. That part of the coast-line beyond and to the north and west of the point reached by old North-West Fox, in 1635 I think it was, is still absolutely unknown and unvisited, and clearly, from the description that Dr. Bell has given us of the country he has visited and of these vast lakes, one of which he saw, and which was then, I believe, for the first time seen by a white man, we may expect, in a country that is absolutely unknown, most interesting results for future explorers connected probably with the Canada Geological Survey. Dr. Bell's nephew also has done most valuable geographical work in correcting the very erroneous map made by the Abbé Petitot, who certainly communicated to us a most interesting paper, but who appears not to have been very accurate in his survey. I have not the slightest doubt, from what we have seen of young Mr. Bell's paper, that he will walk in his uncle's

footsteps and become a most valuable and accomplished geographer and geologist. They have given us two most interesting papers, and I am sure the meeting will wish me to convey to them a vote of thanks, not only for the papers which they have communicated to us, but for the exceedingly interesting photographs which accompanied them.

NOTES ON A JOURNEY FROM ZEILA TO KHARTUM.*

By OSCAR T. CROSBY.

During the period February to June of 1900, I journeyed from Zeila, in British Somaliland, to Cairo, passing Harrar, Addis-Abeba, Markos (the capital of Gojam), Wombera (the westernmost post of Abyssinian troops on the Blue Nile); thence following closely the Blue Nile to Roseires; thence by boat to Khartum.

It was my good fortune while in Cairo to meet Sir Rennell Rodd, secretary to the British agency, who made my official way easy by letters to Captain C. F. Harold, in Samaliland, Mr. Gerolomato, consular agent at Harrar, and Colonel J. L. Harrington, diplomatic agent at Addis-Abeba. These gentlemen, and Mr. J. L. Baird, assistant to Colonel Harrington, by their helpfulness and hospitality, have given me a store of happy recollections concerning a journey which might otherwise have been painful, and in some part impossible. Were the space in this journal available for personal reminiscences, I should become garrulous in writing of the pleasant days in the club at Aden, the mess at Khartum, the Residency at Zeila, and the compound at Addis-Abeba. I may at least say that in meeting these men who stand as outposts of the Empire, an American may learn much of the secret of Britain's glory.

The caravan route followed as far as Addis-Abeba is now a familiar one; it is not probable, therefore, that anything of interest, from a geographical point of view, could be reported from my notes. Camels were used from Zeila to Gildessa; thence to Harrar, donkeys; beyond Harrar, mules. Arrived at Addis-Abeba, I had resort to the unfailing kindness of Colonel Harrington, through whom the necessary interviews with Menelik were arranged, and permission obtained to complete the journey as above outlined.

I felt particularly satisfied with the route chosen for getting out of Abyssinia, since it carried me through a considerable area in the western part of Abyssinia; thence through a sort of "no-man's-land," between Abyssinia and the Sudan; thence to the easterly post of the Sudan, a region not heretofore traversed by a white man. As the difficulties actually encountered were not considerable, I presume the failure to have visited earlier this portion of the course of the Blue Nile has been due to two causes; first, that, as to the Abyssinian region, there has been

* The illustrations are from photographs by Mr. John L. Baird.

some jealousy on the part of the natives because of the existence of gold-fields, and I believe, further, because in this region, later than elsewhere in Abyssinia, the slave trade has been maintained. As to the remainder of the region in question, the Mahdist troubles account sufficiently for the absence of white men during the recent years which have elsewhere witnessed their appearance in almost all of the heretofore unvisited portions of Africa. So far as I could learn by careful inquiry, the portion of the country not hitherto traversed begins in the neighbourhood of Gomar, shown on the accompanying map, and ends in the region west of the Bolassa. The route from Addis-Abeba to the Muga crossing of the Blue Nile, thence north-westerly past Marcos, to Buri, has been already described by earlier writers.

It may be briefly stated, as to this portion of the journey, that the traveller finds himself continually on the great Abyssinian plateau, at an elevation not much varying from 8000 feet above the sea save when he crosses the deep gorge of the Blue Nile or Abai. The depression here is about 5000 feet, and here, as at other points of this great chasm visited by me, there is a very notable exposure of rocks from bottom to top of the gorge. I regret very much that neither the time available nor the technical knowledge on my part was sufficient to yield valuable results in respect to the very interesting geological inquiries that such a chasm must always suggest. For such slight value as they may possess I have transcribed the notes made at this and other crossings of the Blue Nile, in a footnote.*

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* Average angle of descent = about 30°. Six fairly well-defined benches were observed. Important elevation readings are as follows:—

Feet.

9650—Level of plateau before sloping to edge of precipice.
9200—Edge of first sharply defined precipice.
8860—First bench.
8530—Second bench.
7870—Third ,,
7220—Fourth ,,
5740—Fifth ,,
5180—Sixth ,,
4725—Water-level.

On low-water bank, fine river-sand. The lower exposed strata are of dark, rather coarse sandstone. From elevation 5840 to 6300 feet, a layer of soft white stone (specimen not yet tested as to composition), strata substantially horizontal. From 6300 to about 7870, same colour, but texture less uniform. Many boulders show remarkably regular fluted and mottled surface, probably water-marks. From 7870 to 8700, colour darker. From 8700 to 9000, layer of pentagonal stones, about 6 inches across, from 1 to 2 feet (generally) in length, closely compacted, inclination about 15° from the vertical, and slanting upward in a north-westerly direction. Plain at top strewn with small boulders, volcanic, showing many blow-holes. Surface deposit of soil on benches and on river-bank supports thick growth of mimosa, interspersed with sycamore and other large trees.

Same general description applies to descents made at Gomar and at Gum, except that rich-coloured feldspar was noted in large masses, taking the place, it

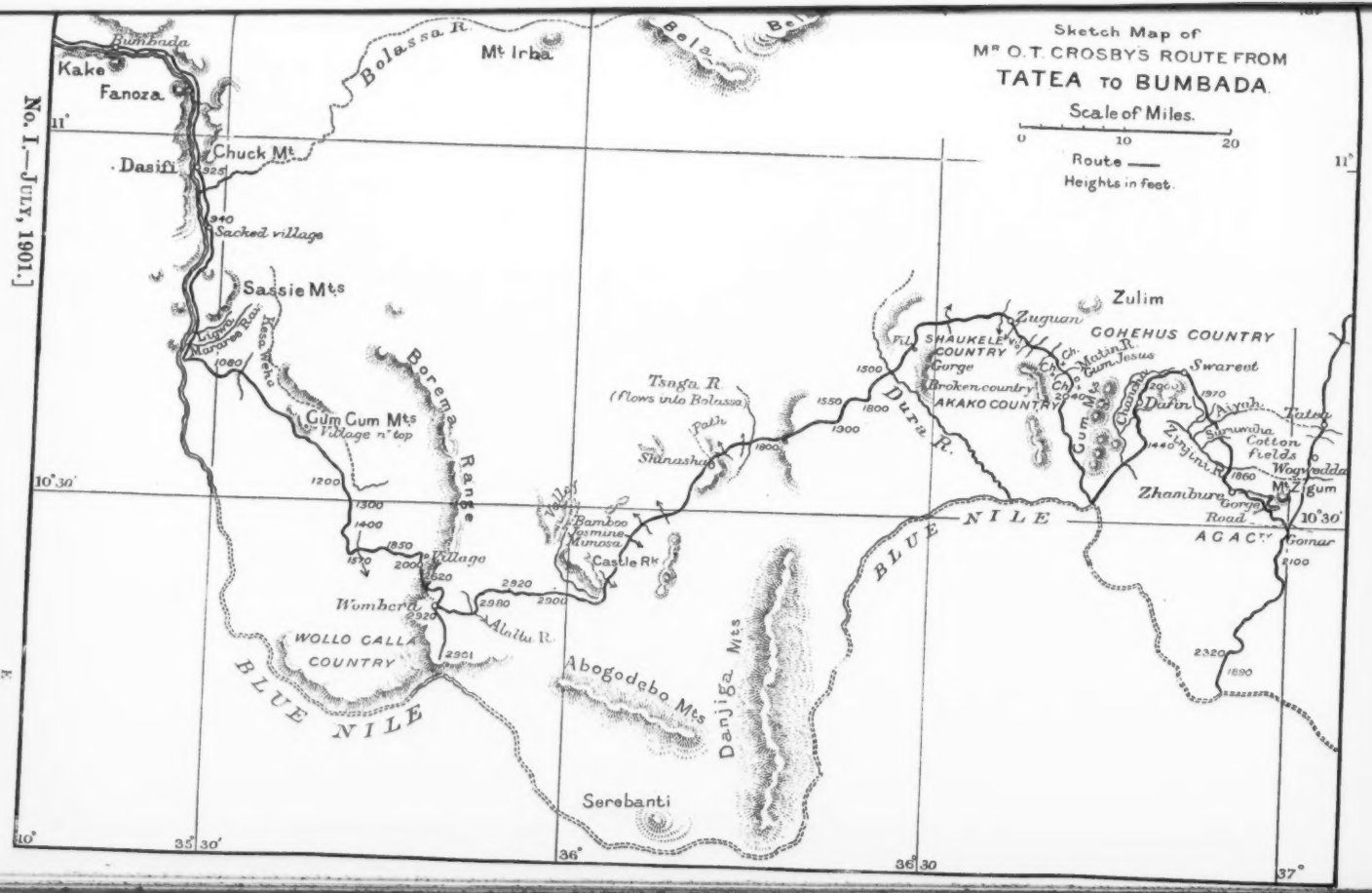
Treating now the region from Gomar westward (see the accompanying map), it is to be noted that the traveller finds the elevation of the plateau slowly diminishing, then again rising to the height generally maintained; arriving at Wombera, he sharply and painfully descends in one day's march, changing his level something like 5000 feet, while covering a distance horizontally measured of not more than 8 or 10 miles. Northward from the line of march, as shown on the map, the depression seemed greater until high elevations were again produced by the rise of the mountains, whose names, as clearly as could be obtained from the native sources, were Bela and Irba.

The plateau seems to have no sharply defined western escarpment beyond the northern point of the Borema range. Beyond this point the slope of the land towards the Bolassa valley makes the transition from the Abyssinian plateau to the flatter Sudan region much more gradual than in the neighbourhood of Wombera, which is the name given to the southern extremity of the range otherwise known as Borema. On the south side of the river, opposite Wombera, the land is low; the irregular hills and mountains constituting the slope from plateau to plain could be seen to the eastward at a distance varying from 15 to 25 miles. It will be noted, by reference to the map, that the Blue Nile makes a sharper *détour* southward than has hitherto been supposed to be the case; here its course was determined by compass triangulation of Danjiga and other peaks seen to rise directly from the cleft separating the northern from the southern slopes. The country lying between the line of march and the river is exceedingly rough, the great plateau being cut into a jumble of valleys and intervening mountains so irregular, so wild, so barren of all population and sustenance for human beings or mules, that no other westward course following the river more closely seemed to be offered at any point.

Two departures from the general line of march were made, leaving the caravan on the plateau, and descending partly on mule-back, partly on foot, to the river's edge, where aneroid-barometer readings were taken as to its elevation. The descents in both cases were exceedingly difficult; the paths made by men were supplemented on the lower slopes by those due to the passages of lion-monkeys, and in the jungle at low levels close to the river, by broader paths made by the hippopotami, in their search for eatable grass. As compensation for these difficulties, many points of view presented scenes of wild magnificence, this being the work of the ages during which a current of water has cut its

seemed, of the whitish rocks above noted; and, further, these descents began farther from the river, and were made over succeeding mountains, while at the Muga crossing, the benches and intervening, nearly vertical surfaces seemed to have been cut out of masses more regular in their original arrangement.

At the Muga crossing a small fossil shell was found embedded in a soft stone, at elevation 6000 feet. Its character has not been determined.


Sketch Map of
Mr O.T. CROSBYS ROUTE FROM
TATEA TO BUMBADA
Scale of Miles.
0 10 20
Route
Heights in feet.
Bumbada
Kake
Fanoza
Mt Irba
Bolassa R.
Chuck Mt
Dasifi
Sacked village
Sassie Mts
Gum Gum Mts
Village n° top
Borema Range
Wombera
Village
Castle Rk
Bamboo
Jasmine
Mimosa
Tsnga R
(Flows into Bolassa)
Path
Shinasha
Alalu R.
WOLLO CALLA
COUNTRY
BLUE NILE
Abogodebo Mts
Serebanti
Danjiga Mts
Zulim
Zuguan
COHEHUS COUNTRY
SHAUKELE
COUNTRY
Gorge
Broken country
AKAKO COUNTRY
Dura R.
Gum Gum
Swareet
Dairn
Tatea
Cotton
fields
Wogwadda
Zhambura
Gorge
Road
AGACY
Gomar
Mt Zigum
BLUE NILE
10°30'
11°
10°
35°30'
36°
36°30
37°

way down through 5000 feet of rock, the edges of the cut being at the same time worn down and borne away, until from level plateau at the north to level plateau at the south, a distance generally of about 6 miles, the whole slope on either side has been cut into a wild confusion, indescribable save by the camera.

The considerable streams which were found on the plateau are, in their order from east to west, the Zinjini, the Aiyah, the Durra, and the Tsaga. Of these the Durra has already been placed on the maps through information given by natives, and its assumed position has not been largely in error. The Aiyah and the Zinjini form one stream at a short distance from the Nile, while the Tsaga finds its way to the Bolassa. The watershed between the Bolassa and the Blue Nile lies only a few miles north of the latter stream, which, between the Durra and the Bolassa, receives by direct flow only small mountain streams. The northward extension of the Durra, Zinjini, and Aiyah, are shown in dotted lines on the map, since their courses could not, from the points of crossing, be followed by the eye for any considerable distance, and only native information was available as to their upper reaches. As these streams were crossed at the end of the dry season, there having been but one or two of the "little rains" to swell them, it may be taken that they are perennial in their flow. I judged them to be about as follows in respect to output:—

Durra, 35 feet wide, 1·5 foot deep, current = 3½ miles per hour.
Zinjini, 40 feet wide, 1 foot deep, current = 2½ miles per hour.
Aiyah, 35 feet wide, 1 foot deep, current = 2½ miles per hour.
Tsaga, 20 feet wide, 0·75 foot deep, current = 2 miles per hour.

The soil of the plateau seems everywhere to be good. The region now considered resembles very closely the already familiar portions to the southward and eastward. In a few places the cultivation was fine enough to recall the fertile region around Harrar; irrigation ditches are not unfrequent; but for the most part the country was found to be industrially in a very poor position; great areas, which a few years ago were said to be covered with fat herds grazing, are now wholly without inhabitants. The cause of the disaster was the rinder-pest or some other bubonic plague, such as that against which the British Sudanese authorities are even now struggling, and which, it is feared, may have come down to them from Abyssinia. For many miles the path lay through great stretches of mimosa, though wherever a church was to be seen it was found densely surrounded by trees of larger growth, prominent among which could always be noted the fir tree. The great spreading tree shown in illustration was rather frequently met, but always isolated. It seems to be closely related to the great wild fig trees found in the region around Addis-Abeba, but many of those seen in this region seem to bear very little fruit as compared with the variety to the south and east. Occasional fields of cotton were

passed, in all cases very poorly cultivated and not growing luxuriantly —save one or two patches hidden in the bottom lands near the river by unsubjected Shankalis, who hide themselves in the valley jungles to escape Abyssinian taxation or servitude. Here they live as best they

DELRA MARKOS, CAPITAL OF GOJAM, FROM SOUTH-EAST.

can, depending, I was told, at the time of my visit, on hippopotamus meat. Exposed in the market at Gomar and Wombera I saw small stocks of the castor-oil bean and of a very black, dirty tobacco. The latter plant, however, I did not see growing anywhere on the route. At one point a few miserable villagers were found living on potatoes, which grew as best they could, neither in furrows nor in hills, but on flat surfaces under spreading trees.

Much of the grass covering great prairies seemed very dry, though, wherever favoured by a slight depression of land leading towards a fair stream, it seemed to be luxuriant enough to have supported goodly stocks of cattle. On the heights of Wombera the grass was very green and luxuriant, and in the small valleys dark olive and fig trees made as pretty a prospect, breaking the rich green of the prairies, as could be desired. The mimosa, when growing thickly and over wide areas, was always called by my interpreter a forest, but, its growth being stunted, I should have myself reserved that name to be applied only to the splendid groves of firs, cedars, and other trees to me unfamiliar, which densely cover the slopes of the plateau leading down to the lowlands west of Wombera. As far eastward as the region of the Durra, occasional date palms were seen on the plateau. In the valleys, such as that of the Durra and the Tsaga, these palms were numerous, and bananas were seen wherever a sharp fold in the valley gave them the necessary supply of water. Neither of these growths, which might be turned to much

account, seemed to add appreciably to the food-supply of the country, the natives being too ignorant or too indolent to properly use them.

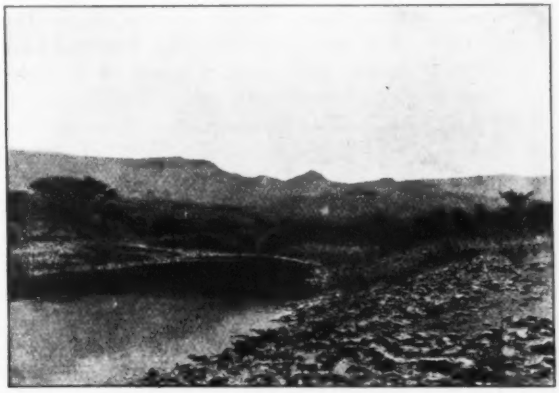
Around one group of villages was found a cultivation of red pepper, said to be the source of a considerable part of the rather large amount of this condiment consumed by the Abyssinians.

As to animals, lions were much talked of, heard once, but not seen. The caravan passed near, on one day, to two leopards that were stalking some near-by deer. Of the latter a number of varieties were seen. I use the term generically, not being expert as to the distinctions which should be drawn. In several instances the herds grazed very near the villages, and seemed to have been but little disturbed save where Abyssinian soldiers, having firearms, were stationed. Wild cats, not much larger than a good-sized domestic animal, were frequently seen dodging from hole to hole in the ground. The hyæna, as usual, was audible, but rarely visible, while his small brother, the jackal, made bolder show. Lion-monkeys, grazier-monkeys, and a variety smaller than either of these were seen at Gomar and Wombera. Guinea-fowls were frequently seen, sometimes in droves of fifteen to twenty. Several varieties of wild duck were shot, from very small to large. They, however, are not numerous, the streams being for the most part very small. The vulturine was seen around a number of villages, apparently much at home. Sheep and goats were about as numerous as in the more familiar parts of Abyssinia. Mules and horses were scarce, although it was reported to me that in a section of country

MONKUSSA, A TYPICAL GOJAMMI VILLAGE.

lying just west of the line of march from Buri to Gomar, a considerable region was given largely to stock-raising. Cattle were very rare, so rare that the Galla were found drawing their wooden ploughs by hand, and it was said at Wombera that the few cattle noted under

the market tree had been driven from the south of the Nile. This scarcity of cattle has already been explained. It was said that the same disease had almost completely destroyed great herds of wild buffalo, which only a few years ago were reported to have been very numerous, especially around Wombera. Unfortunately, I saw none of these, but saw some tracks of a few beasts that still hide in the thickets, and come to the open only when seeking water. The Abyssinian soldiers seem to be rather keen about hunting these relics of an almost extinguished race. Elephants were often heralded, as they are throughout Abyssinia, as being always "a little far." My waning hopes in this respect vanished when, on descending the plateau, I was finally told that the herds which had been ranging in that region only a few weeks before had decamped across the Nile. Again I was forced to seek such satisfaction as could be had out of rare, dry tracks.



MUGGAR RIVER.

As elsewhere on the Abyssinian plateau, the temperature during the day might rise to 95° or 100° in the shade, while dropping at night as low as 38°—to the great distress of the traveller, who had not anticipated such a state of affairs.

The people seen in this region were, first, the dominant Amharic, Abyssinian, or Gojamite. These are, of course, the ruling class. Most of those living west of Gomar seemed to have migrated rather recently from the neighbourhood of Markos. The semitic type is strongly marked. I think it would be difficult to find in Europe, taking them at random, position for position, five more handsome and dignified men than these: Ras Worke, who governs this district under the king of Gojam, and indirectly under Menelik; the Dejasdmach, Hadanah Miriam, governor of Damot, a region around Gommer; Aga Faria Adisi, chief of the household of Ras Worke, at Buri; the officer commanding the

Abyssinian outpost at Wombera; and, finally, one of my guides, a retainer of Ras Worke, humble in station, but of Apollo-like form and feature.

Next may be mentioned the Galla, who seemed to be the bone and sinew of the country, as they are through so large a part of Southern Abyssinia. Those found in this section were engaged in agriculture, but seemed to have suffered much from the disasters above referred to in past years. In the region around Gomar were found the Aga, who impressed me as being a very poor lot. They are not slaves, but seemed to be politically wholly subject to the Abyssinians, and of a much lower level intellectually. Their dress is only a breech cloth, their arms the usual spear and shield. They are already well known.

Beginning at the Durra, and scattered at wide intervals along the route to Wombera, and further westward in the lowlands of the Blue Nile, were found the Shankali, very black, naked save for a string around the loins when living within sight of the Abyssinians, and throwing this aside as cumbersome when free in the jungle. The women wear economically dimensioned fringe dropping from the haunches to a length of about 12 inches, and, when they can be had, adorn their necks with a few bright-coloured beads. While these people are less familiar than the Abyssinians and Galla, they have already been sufficiently described in their country south of the Blue Nile, to need here only identification as being a part of that rather widely distributed people. It is of this material that the Abyssinians have made slaves, and one cannot wonder at it. Those who were seen in servitude to Abyssinian families in and around Markos looked quite as happy and better fed than those who maintained a precarious independence in the bush. While the escort of Aga men, furnished me for a time, seemed to stand in great dread of constant attack from the Shankalis, the latter always took the precaution, on seeing my caravan approach one of their villages, to promptly hide themselves, their women, children, and goats in the adjacent bush. This, however, need not be called cowardice, as their puny equipment of spears and bows and arrows could have been no match even for the modest array of fifteen rifles with which my caravan was armed.

Last, and perhaps most interesting, as being probably not heretofore known, was found a tribe called the Shinasha. They are not numerous, the whole number falling inside of six hundred, and live in a few villages between the Durra and Wombera. These villages are built over areas of rough rock, each hut seeking to lean against some vertical surface of stone, and hide the entrance to small cavities which they use for storing their provisions, the wretched hut itself being bedroom, kitchen, dining-room, drawing-room, and everything else combined. The dress of this tribe is more considerable than that of the Shankalis, but this is to be regretted as permitting higher reaches of dirtiness. Their faces I thought to be rather of the semitic type, although no suggestion of brotherhood with them would be admitted by

the Abyssinians. Intellectually they are evidently superior to the Shankalis, with whom they live in close contact, and whom they hold in a sort of religious subjection. Claiming great powers of necromancy, by menace of rain or drought, they force the Shankalis to yield up to them a part of their scanty store of grain, or meat, or honey. Each village seemed to recognize the considerable authority of a local chief, and I supposed this office to be hereditary, since in one case it was found to be filled by a very young man, probably not more than twenty years of age. They were very much frightened at the approach of the caravan, but were soon soothed, and enforced by the Abyssinian guide into some show of hospitality. A short vocabulary of their language and some Shankali words are given in a note, and these may yield, under the treatment of a linguist, some suggestions concerning the origin of this strange tribe. As my interpreter spoke only French,

THE BIRR RIVER, TRIBUTARY OF BLUE NILE.

Amharic, and Galla, the vocabulary was obtained through rather roundabout methods, and would undoubtedly shock a Shinasha purist.

A description of the region of the Bolassa valley extending as far as Famaka, where the first Sudanese post was found, may be given in a comparatively few words. The general level of the country slopes from the foot of the Wombera mountain rather rapidly to the point shown as Batambo on the map, the drop being from say 4000 feet to 3000 feet elevation.

Beyond this the drop is much more gradual, and the country begins to take on the familiar aspect which the Blue Nile shows through all its course in the Sudan. It is true that there are considerable hills, rising even to the dignity of mountains, close to Famaka. The Bolassa watershed does not extend westward to these hills, as the small streams begin to flow directly to the Blue Nile at a distance of about 5 miles westward of the Bolassa. There is, however, no important affluent

of the Blue Nile between the Bolassa and the Rahad. A number of large ravines are crossed, but they are almost all of them dry except in the rainy season. The Bolassa itself is a considerable stream, pouring into the Blue Nile over rocks, the current being so irregular as to render difficult any estimate of the output. However, making a rough guess, I should say that at the point where I crossed it, half a mile from its mouth, it was approximately 50 feet wide by an average of 1½ foot deep, with a current of 1 mile per hour. The plain was almost wholly covered with a thick scrub, chiefly of mimosa, through which passage was in many places very difficult. The country seemed to have been desolated by war; a number of village ruins showing destruction by fire were passed, and at one of these a guide who had been secured at the Bolassa said he had lost, a few years ago, his hut and two wives. He now, however, had a home and wives elsewhere, and the little mishap seemed to have left no trace upon his genial nature. The inhabitants were seen at only rare intervals, and, as noted above, all showed fright on the approach of strangers. One village (made up chiefly of Shankalis, but presided over by a very black chief, who called himself an Arab) was found perched as inconveniently as possible on the side of a mountain marked as Gum-Gum on the map. The poor creatures had chosen this point, to which they had to lift water from the Nile (here half a mile distant from the foot of the hill), that they might be safe from enemies. The paths that seemed once to have been worn by considerable caravan movements were still good where the soil was firm and pebbly, but had been completely overgrown in places where tolerably thick growth of vegetation was possible, and in consequence we were often forced to make such headway as we could in the portion of the bed of the Nile at that time dry, but in high water completely covered. The progress of the caravan was therefore exceedingly slow, and although the mules no longer had the cruel mountain-sides of Abyssinia to negotiate, they were considerably used up by numerous and exceedingly steep slidings-down and climbings-up in crossing dry gulches or in passing into or out of the high water-bed of the river.

The few inhabitants who were seen in this region were almost on the point of starvation; nor was it possible to find grazing-places for the animals. In the close neighbourhood of the Bolassa, however, we were able to get some bamboo sprouts, which had been found to be a very satisfactory food for the mules. Moreover, they were able to do fair work for two days practically without food. Until we found relief by the purchase of dourra from the stores of the Sudanese Government at Famaka, it had also been rather a close question as to supplying the men. We, however, got through without hunger on anybody's part; nor indeed need we have come at any time to grief, since there were many hippopotami in the stream, easily killed and recoverable within twenty-four hours after being shot; at about which

time, as I judged by experience, one may rely on seeing the black hulk stranded against some rock on the river-side.

Perhaps nothing could better indicate the desolation of the country than the fact that for seven or eight days no hyænas were heard around the camp, and, further, that the dead bodies of some black fellows, killed in a fight with the Abyssinian garrison at Wombera, were found, three days after the fight, only partially consumed, and that by vultures, not by hyænas, and only one vulture to the body, so far as I could note. Although I had been told that the country west of the Bolassa, and almost up to Famaka, was under the control of Ras Mangasha, and that he had a deputy living in the mountains about 20 miles west of Bolassa, who would demand my authority for being there, I found, as

BLUE NILE NEAR TARSO.

a matter of fact, no evidence of government of any kind beyond Wombera, until the Sudanese officer at Famaka, commanding that small station, now the easternmost representative of civilization on the Blue Nile, gave a surprised but hospitable welcome to a white man's caravan emerging from "no-man's-land."

As to vegetation, the domnut palm became frequent from the valley of the Bolassa westward, and furnished to the nearly starving inhabitants an almost impossible food from its hard outer husk. As the stores of grain even at Famaka and Roseires had been brought up from far below, and were considered available only for seed purposes, the natives, when purchasing small supplies of this grain, were commanded not to eat it, but to live yet a little longer on the domnuts and such occasional goat or sheep as might be sacrificed to their needs. The date palm was rarely seen; nowhere was it well cultivated. A very large spreading tree, bearing a fruit which consisted of an oblong shell

containing many seeds coated with dry sugary substance, was frequently seen, and the natives seemed to get some comfort, perhaps even a little nutriment, out of this seed.

The soil was in many places of a rich alluvial character, but also showed considerable areas covered with very brilliant pebbles. It would be exceedingly expensive to irrigate this land, but happily it seems that one good crop can be grown from the moisture supplied by the rainy season. The peace which followed the Kalifa's death last December has given rise to some small beginnings of cultivation at the very edge of Sudanese territory east of Famaka, but in that region, where only the empty claim of Abyssinian authority is made, it would seem that the existing desolation must continue.

A fair number of deer was seen seeking the Nile for water, coming from what must have been their grazing-grounds at some distance from the river. A very few also seemed to find subsistence in the jungles that sometimes closely bordered the river. Here also was seen a goodly number of Guinea-fowls.

As to the Blue Nile itself, it flows in a succession of almost dead pools and live rapids during all that length of its course which I saw. At the Muga crossing its width was 400 feet, its average depth 1¼ foot, and by one not very reliable float measurement, its mid-stream velocity was 0·9 foot per second. The point visited near Gomar is also a well-known ford; as a caravan including rather small donkeys and small Shankali children had crossed it a few hours before I reached it, it may be taken that its depth here is inconsiderable. At the point near Gum, where I next reached it, I found, by wading, a depth of about 5 feet, shoaling rapidly, and a width of about 200 feet, but could not get soundings all the way across, as two Shankalis, with bows and arrows, the latter of which were said by the guides to be poisoned, stood on the southern shore, and, while carefully hiding themselves, seemed to object to any crossing being made. I believe it would have been possible to raft down the stream if one had indefinite time for lifting over the shallows and patching up the raft after what would necessarily be numerous shocks against the rocks of the shore. In the lower reaches, that is, below the plateau, the chief difficulties, aside from the continuing rapids, would have been met in the volcanic rocks which here for many miles line the bank, and at times are found in mid-stream. If, however, there had been another 12 or 18 inches of water, I should judge that some sort of down-stream navigation would have been possible all along the line. In the long southern elbow of the river, although I did not actually see it, I made careful inquiry as to whether any waterfalls existed, and all reports coincided to the effect that only the usual rapids were to be found. The bottom of the stream seems to be pretty well covered with boulders of varying sizes, from that of an apple up to that of a wheelbarrow.

The report of natives was to the effect that high water at the Muga crossing was about 40 feet above low-water level. This would bring it into tree-tops, and I imagine is a condition which has existed only on the rarest occasions. In order that the alignment of this great stream throughout the stretches which are so difficult of access may be known accurately, it may be found necessary to have a survey made by water. This could be done, I think, at mid-stage between low and high water in a strongly-built, small steamboat, which could be carefully pushed up from Roseires, to which point steam-navigation now reaches regularly during all but the very low water seasons. There would be some danger in respect to mid-stream rocks which might be covered at such a stage, but as the speed of the boat engaged in such work would

BLUE NILE AT CROSSING NEAR TARSO.

of course be slow, it would seem to me quite possible to push on in spite of an occasional thump.

It would seem to me that such an examination of the stream would be a matter of great importance, since the whole northern central region of Abyssinia might find a better connection with the sea in this way than as at present by caravan to Addis-Abeba, and thence to Zeila or Jibuti.

The astronomical determinations, latitude and longitude, were made by sextant; time being taken by the half chronometer made in France, called the "Montre torpilleur." This type of chronometer has been made for use on French torpedo boats, where it is said excessive vibration prevents the use of large chronometers. I think its service was good, as I had an opportunity of establishing with considerable accuracy its rate while coming down the Red sea, and again during a ten days' stay in Addis-Abeba, and finally, by the courtesy of Colonel Talbot,

with the proper standards at Khartum. Mercury was used for artificial horison until an originally small stock was exhausted; then resort was had to strained honey, oil, and, when the wind was entirely still, to water. On the daily march angles were taken by a compass every fifteen minutes, horizontal distances being measured by the known and ordinary pace of mule or guide. When the path was particularly tortuous, readings were taken at intervals of five or two and a half minutes. Mountains and other distant objects on either side were located only by compass readings taken as frequently as possible. Elevations were determined by an aneroid barometer. The readings of this instrument compared fairly well with elevations determined by other travellers from Zeila to Addis-Abeba. On arrival at Khartum, however, the reading was found to differ very considerably from the known elevations at that point. The subsequent loss of the barometer has prevented further checking of its accuracy. It is probable that a reduction of something like ten per cent. should be made from all the elevation figures given west of Addis-Abeba. They are recorded as made, since the doubt cannot satisfactorily be settled.

It may be of interest to prospective travellers in this region to know that it was possible to make this journey without very great inconvenience, having a caravan of only nineteen animals. Provisions were, for the most part, carried in wooden cases. I should have been glad to have had these with round corners, as the mules were severely punished in making the numerous ascents and descents. The gaping wounds made on their sides and backs still haunt me a little, but neither the mules themselves nor their native drivers seemed to be as much concerned as I. The caravan, as made up at Addis-Abeba, consisted chiefly of Galla, although these were thoroughly Abyssinianized. They were excellent mule-men, and better all-round men, except perhaps for the chase, than the Somalis. Of these I had four or five who had come up with me from the coast. They felt quite out of place on the highlands, and suffered more than the Abyssinians from the cold nights; differences of race and religion combined to make their fellowship with the Abyssinians somewhat lacking in sweetness and light. I should not now recommend this composite make-up, although it had been advised me by those far older and wiser than I, as preventing a complete conspiracy against the control which one ought to have over his men. There seems to be now sufficient material at a place like Addis-Abeba (especially if one be aided by the kindly guiding wisdom of Captain Harrington and Mr. Baird), in order that a competent lot of men may be gotten at that point. There was one other white man than myself with the caravan, namely, a young Englishman whom I engaged at Aden, and who accompanied me through to Cairo as a general assistant.

On reaching Roseires the men were sent back, and by happy chance, and through the kindness of Lieut. Parker, the solitary British officer in

command at this point, I was able to obtain a native boat, and in thirteen and a half days reached Khartum. This part of the journey was interesting to me, but as it was made through familiar country, nothing further need be said about it.

Mr. J. L. Baird, assistant diplomatic agent at Addis-Abeba, left that point about ten days after my departure, and reached Khartum three hours ahead of me. He went *viâ* Markos, Metemeh, and Abu Haraz. To him are due some of the interesting photographs appearing with this paper.

SHINASHA AND SHANKALI VOCABULARY.

English.	Shinasha.	Shankali.
Father	Tinchoa	Babia
Mother	Tunde	Eyo
Water	Aacho	Aiya
Fire	Tanwa	Mannja
Earth	Datcho	Enea
Air	Zhungo	Zuba
Man	Ikasho	Mitaboga
Woman	Ikamaton	Mitanjofa
Women	Tsinamato	Michichimagafa
Men	Ashutsena	Michichimabega
Lance	Guino	Mooba
Head	Tako	Ilkoma
Foot	Toufo	Tchuguma
Hand	Kisho	Isma
Eye	Auo	Iltchuma
Mouth	Nono	Issama
Cow	Menja	
Horse	Farcha	
Mule	Bola	
Ass	Daja	
Tree	Mita	
Leg	Toofa	
Ear	Waja	
Stone	Swicha	
A child	Naa	
A girl	Maachina	
A boy	Mungusha	
House	Maa	
River	Hoka	
To eat	Mo	Nussana
To drink	Ous	Famia
To like	Neshunfer	Deshactsaam
To die	Kerre	Deshaqua
To run	Wacha	
To fight	Karra	
One	Ikka	
Two	Gila	
Three	Ke'ja	
Four	Aouda	
Five	Oucha	
Six	Shirta	
Seven	Shawata	
Eight	Shimata	
Nine	Zhedia	
Ten	Tacha	
Eleven	Tachaikka	

THE KAFUE RIVER AND ITS HEADWATERS.

By GEORGE GREY.

DURING the year 1899, the "Tanganyika Concessions Co." sent a prospecting expedition, under my command, into Northern Rhodesia. The sole object of this expedition was to search for valuable minerals, and with this end in view its course was directed to those regions which I believed to be as yet unprospected, and it traversed portions of some districts in North-Western Rhodesia which had been previously unexplored. Among other geographical discoveries was that of the source of the Kafue river and many of its northern tributaries.

The expedition was organized in Bulawayo during the months of February and March. The white members of the expedition were five in number: Mr. F. H. Crewe, second in command; Mr. J. N. Justice, geologist; Mr. Paul Macdonald, a prospector of many years' experience in South Africa; Mr. M. G. Farquhar, who accompanied the expedition for the sake of sport, and the interest of travelling through new country; I myself being the fifth.

Mr. Crewe was killed in March last, while fighting with Colonel Plumer at Ramathlabama. I cannot too much deplore the loss of one to whom to a great extent the success of this expedition was due. He was an accomplished native linguist, and thoroughly understood the native mind. By his unfailing tact and patience, he did much to enable the expedition to gain the confidence of the many native tribes through whom it passed, and to avoid in any single instance serious misunderstandings or hostilities.

The natives who left Bulawayo with the expedition numbered thirty-eight, and consisted of Zulus, Fingoes, and Matabeles. Twenty-five of them carried rifles. Transport was almost entirely done by animals, and for this purpose 67 donkeys, 6 oxen, 7 horses, and 2 mules were taken. The donkeys and oxen drew three waggons as far as the Native Commissioner's camp at the Lubu, which is about 25 miles south of the Zambezi river. From that point all the animals were packed or ridden. I consider that transport by donkeys is, where possible, preferable to the use of carriers, mainly because of the great difficulty of feeding a large number of carriers in sparsely inhabited districts.

The expedition left Bulawayo on April 5, and proceeded along the Lubu waggon road to Lubu, from there to Binga's kraal on the Zambezi river, lat. 17° 38′ S. Binga's kraal was reached on May 8, and the river crossed on that and the two succeeding days. From the Zambezi river the course lay nearly due north to the Kafue river, passing the British South Africa Police camp at Monze's, and following the Magoyi river to Minenga's kraal, in the eastern part of the Mashikolumwe country; then from Minenga's to Ntumiga's, on the Kafue. The Kafue was

crossed on May 30, in lat. 15° 39′ S. From the Kafue a north-easterly course was taken to the headwaters of the Chongwe river, and the course and valley of the Mwembezi river, a tributary of the Kafue, was explored. A temporary camp was formed near the source of the Chongwe, and a small party proceeded to follow that river to the point where it runs into the rough hills that form the edge of the plateau and the northern boundary of the Zambezi valley. From that point they went in an easterly direction to Unde-unde's kraal, and from there north, descending from the plateau to the valley of the Lunsefwa. The Lunsefwa, which is a tributary of the Loangwa, was touched near its junction with the Mulungushe, lat. 14° 54′ S., and from this point the party returned to the expedition's camp on the headwaters of the Chongwe. On July 19 the whole expedition again started northwards. They passed Chepepo's kraal, and crossed the Lukanga river near its source in lat. 13° 52′ S.; then crossed the Kafue, for the second time in lat. 13° 19′ S., between its junction with the Konfulafuta to the north and the Pongwe to the south; then a course rather west of north was taken; the Kafubu, a large tributary of the Kafue, was followed to its source, the headwaters of the Lufunsusa were crossed, and the Kafue again reached and crossed in lat. 12° 14′ S., at Lambula's kraal, some 40 miles from its source.

From Lambula's, the expedition, in order to avoid swamps, proceeded to and followed for a short distance the watershed between the tributaries of the Kafue and those of the Luapula. The Kafue was crossed for the last time on August 25 in lat. 11° 53′ S., and from this point I followed the river to its course, about 28 miles further north. The expedition then proceeded, with a course rather south of west, to cross all the northern tributaries of the Kafue, and a temporary camp was formed at Kwa-Nyunda, on the Mutanda, while this district was explored. The courses of the upper parts of the Mutanda, Kifubua, Lunga, Munyoshi, and Shilumba were all mapped.

On October 1 the expedition started south, and for about 100 miles kept at some distance from, but parallel to, the Lunga; then followed the Lunga to its junction with the Kafue, and the Kafue to the point where it bends sharply to the east near the Nkala mission station. The junction of the Kafue and Lunga was found to be in about lat. 14° 40′ S. The Matoka plateau was then crossed with a south-easterly course, and the main part of the expedition crossed the Zambezi at Binga's kraal on November 9. The majority of the expedition reached Bulawayo on November 24, the last waggon arriving on December 1. Thus, in less than eight months the whole expedition had travelled approximately 1750 miles, and at least another 1250 miles had been travelled by small parties making tours from temporary camps at which the expedition halted.

As much care as possible was given to survey of the route travelled

and of the country adjoining the route. Observations for latitude were taken every day when possible; the average direction of every march and its distance were carefully estimated.

To a South African, travelling north from Southern Rhodesia, the first great point of interest is the Zambezi river. The Zambezi river has been so often described that I shall only say here that I found it 480 yards wide at Binga's kraal where the expedition crossed it, and about 200 yards wide at Walker's drift, some 30 miles higher up, where I crossed on my return journey. From May 8 to 10, I found it still rising slightly; probably it was at about its highest for that season. No one could fail to be impressed by the magnificence of the mighty river, much less a Rhodesian, used to a country in which, during the greater portion of the year, running water is the exception.

The Zambezi valley is bounded on the north by very rough, steep mountains, which form the southern edge of the Matoka plateau. This plateau is now fairly well known; I found it to be between 3100 and 4250 feet above sea-level. Much of it appears to be an exceedingly fine, well-watered, stock-raising, and agricultural country. The soil is remarkably deep, and, judging by the splendid crops of Kafir corn and the thick luxuriant grass we passed through, must be very rich. The plateau has the appearance of a country healthy for man and beast. The Kafue river is the northern boundary of the Matoka plateau.

It may be of interest to give a general description of the Kafue river as known to me from actual observation in the dry season. In and immediately after the rainy season, which ends in March or April, all or most of the streams mentioned must carry much more water than they did at the time that I had the opportunity of observing them. Therefore my descriptions of fords, etc., must be taken as applying only to the winter or season of low water.

The Kafue is a river of many native names. From its source for a considerable distance it is known as the Lufubu. At and for some distance below its junction with the Lunga it is known as the Loenge. Below its western bend it is called the Kavuvu, Kafukwe, or Kavuvwe. I have never heard it called the Kafue by any natives, but am told that the natives who live on the Zambezi, near the junction of the rivers, speak of it as the "Kafue." Kafue is, however, the general name by which it is known to Europeans, and I therefore refer to it by that name. The Kafue rises in about lat. 11° 30′ S., at an elevation of 4400 feet above sea-level. Its source is similar to the source of all the streams I visited on the Congo-Kafue watershed. It heads in a dense clump of trees and bush which grow in a swamp. A rocky ridge about 200 feet high lies immediately to the north of this swamp, and is part of the watershed. The streams on the other side of this ridge run either into the Lufira or Luapula rivers, both of which eventually help to form the Congo.

All the country in the neighbourhood of the source of the Kafue is very swampy, and the river is fed by numerous small runners which drain extensive areas of swampy ground. As it is followed south-westward, it rapidly increases in size. Twenty-eight miles from its source a ford was found where the river was 10 yards wide, knee-deep, and carried a strong stream. To this point the Kafue had fallen 400 feet, and had run through narrow open flats bounded by low timbered ridges. The course is very winding, and is marked by a thin line of bush which grows on each bank and overhangs the water. Below this point the river enters and flows through a very extensive papyrus swamp, which is often some miles in width, and is probably 20 miles long. At Lambula's the river is again found to be enclosed between firm banks. Two large tributaries, the Shilumba and the Munyoshi, have entered it from the west, and I found the river at the crossing to be 20 yards wide, averaging about 2 feet in depth, very swift with a gravelly bottom. The general character of the stream, however, is sluggish and deep, and the bottom is muddy. Good fords are rare. The general course of the river from its source for 150 miles is south-east. It then bends to the south-west, and flows in this direction for about 200 miles, until it is joined by the Lunga in about lat. 14° 40′ S.

In this section I crossed it in lat. 13° 19′ S., and found a ford 70 yards wide, and not more than 3 feet deep; but, as higher up, the river is generally sluggish and winding, and I saw still reaches of water many miles in length. At its junction with the Lunga, the Kafue is between 150 and 200 yards wide. It has received many large tributaries—the Konfulafuta, Pongwe, and Lukanga from the east, the Kafubu, Lufunsusa, and probably many others from the west. In every place that I touched or followed it, between Lambula's kraal in lat. 12° 14′ to its junction with the Lunga, the Kafue runs between low well-defined banks, and flows in a winding course through a narrow open valley. Its course is marked, as higher up, by a fringe of trees and bush.

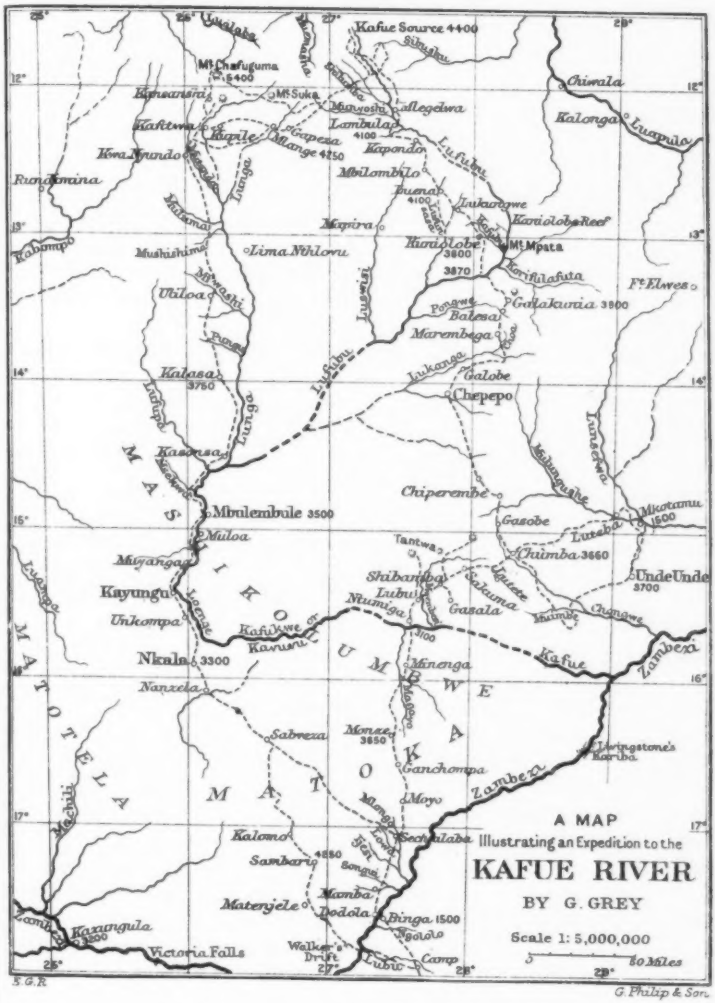
The Lunga is the Kafue's largest tributary, and is at its mouth about 100 yards wide. It heads, as does the Kafue, on the Congo watershed, the actual source of the Lunga being not more than 35 miles from that of the Kafue. The Lunga increases in size more rapidly than the Kafue, as it is followed from its source. It receives from the west the large tributary the Mutanda, about 60 miles from its source, and lower down the Muluma, Mfwashi, and Pungu. The Lunga in character resembles the Kafue; it has, however, greater fall. In 200 miles the Lunga falls 1300 feet, while the Kafue has only fallen 900 feet in a distance of 350 miles. In consequence of a steeper slope to the ground, the headwaters of the Lunga are less swampy than those of the Kafue. Below its junction with the Lunga, the Kafue develops into a most magnificent river. Its elevation is 3500 feet at the junction, and it

only falls 400 feet in the next 250 miles. It retains its winding character, following between firm low banks, and for 50 miles varies from 200 to 600 yards in width, is very deep, and has no perceptible current. Unfortunately, as it is followed down, it is found that extensive rocky ridges cross the river, splitting it up into swift narrow channels, and destroying all possibility of continuous navigation by large boats. Such granite bars I noticed both at Mbulembule's kraal and at Muyanga's.

From the Lunga, lat. 14° 40′ S., to Nkala mission station, lat. 15° 55′ S. (approx.), the general course of the river is slightly west of south. It receives in this distance very few tributaries, and those of no importance or size. Near the Nkala mission station, after receiving the small tributary, the Musa, the Kafue bends sharply to the east, and flows for about 150 miles through a wide level valley or plain, which has the appearance of being the bottom of an ancient lake, and is bounded on the east by a prominent ridge of mountains. The Kafue has cut through this ridge, and so drained the lake. The expedition crossed this valley on its northward journey, and I found the valley at the point of crossing to be from 20 to 30 miles wide, and about 3100 feet above sea-level. At highest water much of the valley is covered by the overflow from the river. This valley is quite treeless, and, until the grass is dry enough to burn in July or August, is covered with dense grass 6 feet high.

Such tributaries as run towards the Kafue from the north and south seem to lose any regular defined channels after they enter the valley, and either disappear entirely or lose themselves in extensive swamps. Owing to these swamps, the river is in this section, I imagine, often very difficult to approach. The expedition was fortunate in being supplied with good guides by the Shukolumwe chief Minenga, who brought it over solid ground to a place where there were firm banks on both sides of the river. The Kafue there (Ntumiga's kraal) is only about 100 yards wide, and has a current of 2 to 3 miles an hour. This is probably one of its narrowest points; in some places in this valley, I believe it attains to a much greater width. From a little hill on the northern edge of the valley, north-east of Ntumiga's, I overlooked the valley, and saw to the south-south-east the river 15 or 20 miles distant. The course of the river was marked by a long stretch of blue open water, and the river must at that point be very wide. We crossed this huge valley in winter, and found the cold very severe. The thermometer frequently fell below freezing-point at night. Owing to its treeless character, we suffered from want of fuel. Small quantities of wood could generally be bought from the native kraals, but when it was necessary to camp at any distance from a kraal, the entire absence of firewood and severe cold caused real suffering among the native members of the expedition.

The Kafue, when it leaves this valley or plain, passes through a prominent range of mountains, and in less than 100 miles joins the Zambezi river. The elevation of the plain is slightly over 3000 feet, the elevation of the Zambezi 1500 feet or less. There is, therefore, a fall


Kafue Source 4400
Mt. Chafuguma 5400
Mt. Suka
Chimala
Kalonga
Lwapula
Kapeansai
Kafukwa
Kapile
Kapesa
Mange 4250
Kapondo
Lambulaga 4100
Allegewa
Mbwesha
Kwa Nyundo
Mbilombilo
Lufubu
Lunga
Mukena
Mapira
Buena 4100
Lukangwe
Kariolobe Reef
Kariolobe
Mt. Mpata 3870
Mushishima
Lima Nhlovu
Mbwashi
Vililoa
Kalasa 3750
Kasensa
Mbulembule 3500
Muloa
Miyanga
Kayungu
Unkompa
Nkala 3300
Nanzela
Sabreza
Kalomo
Sambaria 4250
Materjele
Kazungula 1800
Victoria Falls
Walker's Drift
Lubu
Camp
Rundamana
Kabompo
Mwinilunga
Balesa
Marembega
Lukanga
Kalobe
Chepepo
Chiperembe
Gasobe
Tantwa
Shibanbega
Lubu
Nkumiga
Kafukwe
Karuru
Mineng a
Monze 3850
Sanchompa
Mayo
Mamba
Dodola
Binga 1500
Ngalo
Kafue
Zambezi
Livingstone's Kariba
Chimaya
Tuimba 3660
Lutuba
Undeunde 3700
Mkotamu 1900
Lukanga
Lusaka
Gasala
Mumbi
Chimaya
Mwinilunga
Lunsemfwa
Mukungule
Lwena
Lwanga
Mwinilunga
Mashukulumbwe
Mashukulumbwe
Mashukulumbwe

and not rapid. Most of the fall, then, must take place in a distance of from 40 to 60 miles. Such a fall must make any kind of navigation absolutely impossible.

The area drained by the Kafue may be described as of oval shape, 350 miles north to south being its major axis, and 250 miles east to west its minor axis. The extreme north of this area supplies a much greater proportion of water than the southern and central portion; the rainfall in that portion north of lat. 13° must be much heavier than further south. The extreme southern portion of this area is the north half of what is known as the Matoka plateau. This plateau really extends north without a break to the Congo watershed, the slight descent to the lower Kafue from the south and the ascent on the northern side being so gradual as to be barely noticeable.

The expedition did not explore the Mashukolumwe country, which is reputed to be open, high, well watered, and hilly. The course chosen lay to the east of that country on the northern journey, and to the west of it on the return.

I found the country immediately north of the lower Kafue to be very similar to the Matoka plateau; the bush perhaps rather thicker, and the proportion of open country less. Much of it is well watered and fertile. A particularly fine open valley is that of the Luimba, a tributary to the Chongwe. North of lat. 15° the country was mostly covered with thick bush; it may be described as a rolling or level plain gradually ascending as it is followed north, generally covered with deep alluvial soil. Streams are numerous, though we found the country in the neighbourhood of Chepepo's to be badly watered. That portion between lat. 14° 40′ and 15° 40′ which lies to the west of the Kafue is, I believe, very dry and badly watered.

The Lukanga river intersects this plain. This river is remarkable for the immense papyrus swamp through which it runs. The swamp is often more than a mile wide. The expedition followed it for more than 20 miles, and nearly reached its source before a ford could be found over which the donkeys could walk. A man can cross in many places by walking on the dense reeds, which grow so close and thick that when bent down they will support his weight. In crossing over one of these places, I sounded with a long stick, and found that I was walking over the main channel of the river with 7 feet of water below me. The Lukanga is also remarkable for the immense flocks of geese and ducks which make their home in its swamps.

North of the Lukanga the country becomes gradually wetter and more swampy, and the bush and timber thicker and larger. From lat. 13° to the Congo watershed, I found the whole of the country which is drained by the Kafue and its tributaries to be of a very swampy character. We had great difficulty in traversing this country with our donkeys. Every little valley contained a swamp, into which the

animals sunk up to their bellies; every stream—and streams are very numerous—runs through deep alluvial soil, and its banks and bottom are mud of the softest character. The donkey is an excellent animal on hard or rocky ground, but does not show to advantage in mud. For several weeks travel was a most wearying business. Every march meant dragging the donkeys one by one through several swamps or streams, off-loading on one side and carrying the loads through to load up again on the other.

This extreme northern part of the Kafue basin is of much the same character as the country further south—that is, featureless forest. There are, however, a few prominent mountains, such as Chafuguma and Suka, which rise from 600 to 1000 feet above the surrounding country. Here and there are found patches of fine timber, but as a rule the trees are not large. Still, the further north the expedition travelled the thicker the bush was found to be, the taller and straighter the trees, and the more numerous were trees of a size which would make them suitable for the sawmill. Machabel, mahobohobe, and acacia, well known in South Africa, are found as far north as the headwaters of the Congo, and many other trees which I do not know further south. All kinds of thorn trees are conspicuous by their absence.

The monotony of this huge forest is relieved by numerous fine streams of water. As will be seen from my map, rivers at the extreme north of the basin are very numerous. All the tributaries shown are fine running streams of beautifully clear water. These rivers increase in size very rapidly as one follows them down from their sources. I saw the country in August, September, and October, the driest time of year, and was impressed by the great flow of water in the streams, and by the fact that there is evidence that the rivers never rise very much higher. The natives cross the streams on roughly made pole bridges, often only 3 or 4 feet above the water; over these bridges they told us that the water never rises. Nevertheless, it seems probable that the Congo-Kafue watershed has a very heavy annual rainfall, to keep up the enormous quantity of water which flows into the Kafue through these numerous tributaries.

The elevation of this northern portion may be said to be between 4000 and 5000 feet above sea-level. The lowest point that I visited on the watershed was 4400 feet, the highest 5000 feet.

All the mountains which bound the southern edge of the plateau north of the Zambezi appear to be composed of schists and quartzite. The plateau itself is generally found to be sandstone, generally horizontal. Some large areas are covered with crystalline limestone, notably east of the Mwembezi river and near the sources of the Shoa. Granite outcrop is scarce, and we never found it extensive. Iron is found to exist in large quantities nearly everywhere, and in the northern portion visited the mountains and hills, such as Chafuguma and Suka, are

composed of ferruginous sandstone; ferruginous conglomerate covers large portions of the country.

As the expedition stayed for such a short time in any one place, and as all its members, both white and black, were strangers to Central Africa, we did not attain to any great degree of intimacy with any natives, and only brought back a very general impression of their customs. Owing mainly to one Matabele, Mkoman by name, an old servant of Mr. Crewe, I never had any difficulty in freely communicating with any of the native tribes through whose country we passed. This Matabele boy started with a very good knowledge of the language talked by the natives on the Zambezi, and, being a born linguist, seemed naturally to pick up the different dialects of the northern tribes, which are all akin to the dialect spoken on the Zambezi. Mr. Crewe spoke a little of the Batonga language, and was able to talk to the northern natives, to a limited extent, without the help of an interpreter. Various native members of the expedition could talk the language of the Barotse and other similar dialects.

The Batongas of the Zambezi are, of all tribes we passed through, the most miserable and lowest type. They are lazy and unreliable; their habitations are the roughest form of grass huts; they appear to have barely any arts or industries, and are most cowardly. The Zambezi river has probably been their salvation, as, living on the banks of the river, they are always able to cross on to islands or to the opposite bank, and so have avoided extermination by raids of Matabele or other powerful tribes. The Zambezi native has a strong hereditary love for the river, which has for generations afforded him protection and supplied him with food in the shape of fish. But in spite of the long sojourn of himself and his ancestors on the river-bank, his canoes are the crudest productions that can be imagined. Any large tree is used, regardless of the irregularities of its shape, and is roughly hewn out; the result is a heavy hollow block of wood, often far from straight. Four hundred pounds is a good load for the best Zambezi canoe. No art is displayed by the Zambezi in making his paddle; it has no width of blade, and is generally little better than a stick; in fact, he will often work his tedious way across the river with any stout stick when a paddle is not at hand. Still, the Zambezi knows his river well, and we found the natives most willing to help us in the work of getting the animals and goods of the expedition across.

Mr. Gielgud, the native commissioner, came down from the Lubu and camped with the expedition while we were crossing the Zambezi. He kindly used his influence with the natives, and made all arrangements for our passage, getting nine native canoes to work, and lending us his boat. The price arranged was 5*s.* per day for each canoe. Our seventy-eight animals and 8000 lbs. weight of goods were all safely landed on the north bank by the evening of the second day after our

arrival on the river. The natives thoroughly understand this work, and the white man has only got to keep them at work, and no hitch occurs in crossing any number of animals.

When crossing oxen or donkeys, three men work a canoe; two are paddlers, one at each end, the third sits in the middle and holds the head of the animal close to or resting on the gunwale of the canoe. Once the animal loses its footing the work is easy enough, but it is often difficult to launch an obstreperous ox, who will resist being dragged and pushed into the water, and often makes a rush back for the bank, climbing over the canoe, filling the boat and knocking the boatmen into the water. The natives take all such accidents good naturedly, and those who get ducked join in the laugh raised by the others. Donkeys are far more passive; they are easily pushed into the water and towed across. They seldom make any effort to swim.

The Zambezi natives grow mealies, corn, ground-nuts, and sweet potatoes; they own considerable numbers of sheep and goats, but are most unwilling to sell any of their live stock. Along the low banks of the river mealies are planted and ripen at various seasons, drawing their moisture from the river, and being independent of rain.

The Batoka, who inhabit the plateau to the south of the Mashikolumwe, are very much akin to the Zambezis in nature and habits; like the Zambezis and the Mashikolumwe, both sexes knock out the four upper front teeth. On our journey north we found the Batoka natives very timid; kraals were entirely deserted on news of the approach of the expedition, the inhabitants flying into the bush and hills. This is, I think, due in a great measure to certain irresponsible white men who went up into this country in the winter of 1898, and, in pretence of trading, raided, robbed, and disgracefully treated the helpless Batoka. This raiding has now entirely ceased, owing to the establishment of two police stations on the plateau, and the promulgation of certain regulations by the B. S. A. Co., regarding traders in Northern Rhodesia.

The Mashikolumwe inhabit the valley of the Kafue river from its western bend until it leaves the plateau. They extend to some distance north and south of the river. The Mashikolumwe are as savage a tribe and as far removed from any from of civilization as can be found in Central Africa. Probably justly they have a reputation for treachery. Though the women wear as much, if not more, clothing than is customary in Central Africa, the men in nearly all cases go absolutely naked. Every man carries a bundle of long-handled barbed assegais. Nearly every man has dressed, or, to describe it more accurately, forced, his hair and scalp into the knob or spike which is peculiar to this tribe. Many wear the full head-dress, which looks like a long, straight, and flexible wand starting from the back of the head. One of these head-dresses I measured and found to be 45 inches long, measuring

from the skin of the head upwards. The head-dress is made of hair and grease, with a finely shaved piece of sable antelope's horn inside to stiffen it. In making it, the skin of the head is drawn back until a mass of flesh and skin protrudes 2 or 3 inches from the back of the head. This causes great pain at first; one whom we asked replied, "We bear the pain because of the beautiful result." On this artificially made base of soft flesh is built an upright cone, gradually tapering to less than 1 inch in diameter, and prolonged to at least 3 feet in height. The straight upright piece is quite flexible, and waves in the wind. The completed head-dress takes about three years to make, and the happy possessor of a 45-inch spike attached to his scalp takes great care of it. When he sleeps in a hut, the flexible end is tied by a string to the roof; when sleeping in the open, a long-handled assegai is stuck firmly in the ground at the man's feet, and the end of the head-dress is tied by a long string to the shaft of the assegai, so keeping it off the ground. In spite of the time and trouble taken to make these head-dresses, some of the men offered to cut them off and sell them for a few yards of calico. I had hoped to buy some on our return journey, but unfortunately passed south just west of the Mashikolumwe country, and saw no more of this peculiar head-dress. Though not tall, the Mashikolumwe are well made and active, and, judging by some who followed me when hunting on horseback, good runners.

We camped one night at a Mashikolumwe kraal between Minenga's and the Kafue river, and found that we were the first white people who had travelled on that path. Mbwire, the chief, had never seen a white man, and came to visit us wrapped in the skin of a lion, which had been killed in his cattle-kraal. I gave him a cup of very sweet tea, and was much amused at the way in which, after suspiciously tasting it, the old man clutched it tight and drank every drop, while his people looked enviously on. I found the natives at Ntumiga's kraal on the Kafue river to be very expert boatmen. Their canoes show much greater signs of skill in their manufacture than do those we saw on the Zambezi. They are very much thinner and lighter. It is, however, evidently very difficult for them to find trees large enough to make canoes of any size, and those can only be found at some distance from the river. Some canoes we saw were made out of two trees, one forming the bow, the other the stern, the two halves being neatly laced together with bark. Most of the canoes were more or less patched, and numerous leaks had to be constantly plugged with clay. The Mashikolumwe have much better paddles than the Zambezis; some were seen ornamented with carving. The natives, when paddling on the Kafue, stand upright in the canoes, and force them through the water at a considerable speed.

The Mashikolumwe own more cattle than any other tribe we visited. I saw several herds of cattle in the small part of their district

that the expedition passed through. The cattle are all of the very small type peculiar to this part of Africa. They are very unwilling to sell their cattle. We had no difficulty in obtaining at moderate prices an ample supply of grain from the Mashikolumwe in the neighbourhood of Minenga's, but on our return journey found the western Mashikolumwe had no food to sell, owing to the destruction of their crops by locusts.

The natives living to the east of the Mashikolumwe and the north of Kafue call themselves Basala, or Basola; they inhabit the country as far east as the eastern edge of the plateau. Important chiefs among them are—Shamaponda, who lives on the headwaters of the Mwembesi river, an old man who remembers the Swazi raid, and was taken prisoner by the Swazis when very young; and Ma-unde-unde, whose kraal is some 15 miles west of the Chongwe river.

In the valley of the Lunsefwa the natives are called the Baluana, Luana being the name of that district. The Baluana, who have had dealings with the Portuguese, I found particularly civil and well mannered. Their women wear the pelele, a metal disc inserted in a hole made in the upper lip, which is common to many tribes living east of the Loangwa river. The Luana district is famous for the fine tobacco grown there. We bought for calico a considerable quantity for the use of our Matabele.

Among these tribes I saw very few guns of any description; all the natives carry bows and poisoned arrows. The poison is in the form of a black waxy-looking material, and is put on the shaft of the arrow just above the point.

In the neighbourhood of the Lukanga a similar tribe, called the Balenje, live. North of the Balenje I quite failed to find any tribal name for the natives. The people of every kraal go by a different name; we found such names as Balamba, Baseba, Manyendwa, Bakaunda, and others. I came to the conclusion that, though these people are of one tribe or race, they know no name to denote their tribe, the names they gave us being family names.

Throughout the country drained by the headwaters of the Kafue and its tributaries, I found no big native chief. Small chiefs rule over small districts. Chepepo is a man of some importance, and further north Kapile Mpanga, Mlongo, and Mlegelwa appeared to have some influence. Several kraals are ruled by women, such as Luena and Lambula.

An Arab called Chiwallah lives on a tributary of the Konfulafuta, an eastern tributary of the Kafue, between lats. 13° and 14°. Chiwallah is much feared by the natives in the neighbourhood, and has established a reign of terror over a considerable area.

In the districts of Lambula, Mlongo, and Kapile Mpanga, the people build square huts with a round roof. They seldom wear skins, the

natural clothing being made of the bark of the machabel, which, when new, makes a neat and tidy blanket or loin-cloth, but soon gets ragged and torn. Those who have calico wear it in preference to the bark.

Though we were never without a sufficient supply of grain while staying among these northern natives, it did not appear that the natives possessed very large supplies of food. A common article of food is the root called cassava. Very little maize is grown, but a fair quantity of Kafir corn and sweet potatoes. From the number of fish-traps seen in all the smaller streams, I conclude that at certain seasons the natives live to a great extent on fish.

The method of cultivation in this part of Central Africa is as follows: The lands chosen are always in thick bush or timber. Over a large area the timber is chopped down, the stumps being left about 30 inches high. The smaller branches are then chopped off the trees, and are collected and piled thickly in strips of a few yards in width through the area cleared, care being taken to include all the larger ant-heaps, which are very fertile, within these strips. When thoroughly dry, these strips of branches and twigs are burnt, and the ashes serve to manure the soil beneath them. The fire also probably destroys the weeds and grass and makes the soil easier to cultivate. Thus a large quantity of forest is cut down every year to fertilize a proportion of its area. The stumps left sprout out again, and soon grow up into dense thickets of bush.

The custom of knocking out the four upper front teeth was not noticed north of the Mashikolumwe. The tribes in the northern part of the Kafue basin file each of the upper front teeth to a point. Individuals dress their hair in various eccentric ways, one of the commonest being to form it into round knobs, 2 or 3 inches in diameter; another to train it into cones or horns, one on each side of the head. Luena, a female chief, had grown a long plait of hair from her forehead, which was decorated with beads, and hung down over her nose to the level of her chin. Chiefs of kraals generally wear quantities of beads in their hair.

The custom of saluting a chief or important stranger is peculiar. The men kneel down, clap their hands, and then, bending forward, rub one shoulder and arm on the ground. Before a very important chief, they lie on their backs and wriggle on the ground. These antics remind one of the cringing submission of a timid dog, which they possibly imitate. The women, when saluting an important stranger, do so by lullilooing, a word coined by Livingstone to express a peculiar shrill scream, the sound being made to vibrate by hitting the mouth with the hand. At one kraal, passed in the Basola country, the women expressed submission by lying on their backs on the ground and clapping their thighs—not a very elegant proceeding.

We found that the members of the expedition were the first white

people who had ever travelled through a large portion of the country drained by the headwaters of the Lunga and the Kafue, and that the natives in these districts had never seen a white man before. The horses and donkeys created great interest, and when camping near kraals, numbers of natives used to occupy large ant-heaps or other commanding positions with the object of watching our animals. With a very few exceptions, these natives, after the first natural suspicion aroused by the approach of a comparatively large armed force had been allayed, appeared very pleased with our presence. It was pleasant, when visiting a kraal for the second time, to find a genial welcome.

Obtaining food is a much simpler business north of the Zambezi than among the Matabele or Mashonas. It is the custom, when a caravan camps near a kraal, for the chief to visit the leader of the caravan, bringing with him a present of food, generally large baskets containing meal, sweet potatoes, and ground-nuts, as well as some fowls and Kafir beer. When a rich kraal was visited, the chief's present was often more than sufficient to feed the whole party for one or two days. The size of the present depends, of course, to a great extent on the supply of food owned by the kraal. At Mlegelwa's, the chief's present amounted to 140 lbs. of meal, a large quantity of potatoes, some fowls, and Kafir beer. The chief refuses to visit the stranger without a present, to do so being apparently considered very bad manners. Considerable delay is sometimes caused by the preparing of the present.

Muyanga, who lives on an island in the Kafue, came to visit the expedition without the customary present. He was followed by a boy carrying a stool, which was put down opposite my tent. Without a word of warning, Muyanga told his stool-bearer to pick up the stools and, in spite of the expostulations of our interpreter, walked quickly away and crossed over to his island. I could only suppose that we had unwittingly offended him, and that he had gone away in a huff; a messenger was sent to ask the reason of his extraordinary behaviour. The answer was, that when Muyanga saw the white men, he realized what great chiefs they were, and was ashamed to have come to see them without a present, and would not return until he could come bringing an ox with him. That evening he came, bringing a young heifer and some meal.

Insect pests appear to be particularly numerous in the northern part of the Kafue basin. White ants are more plentiful and more active than I have seen anywhere else. Owing to the numerous swamps, flies of various kinds are abundant, and as early as September the large biting fly called the "hippo" fly was a great annoyance. Our stock suffered severely from the thousands of these flies which attacked them every evening. Many of the donkeys used to come in with their legs running with blood from the bites of these pests, and made raw sores on their hocks by biting at the flies. Midges are also particularly

virulent. North of lat. 13° I found the natives suffer considerably from the jigger, the small burrowing flea so well known on the West Coast of Africa and in Nyasaland. The natives called it maunda. When we first found the jigger, and saw many of the natives so lame that they could hardly walk in consequence of its attacks, I anticipated that we should have great difficulty with our Matabele, who, never having seen or heard of the jigger before, would, I thought, suffer worse owing to inexperience than the local native. Most of my boys had at one time or another jiggers in their feet, as had I myself and other members of the expedition. I was relieved to find that, if care was taken, the jigger extracted as soon as he was noticed, and the hole he had made treated with carbolic oil, the inconvenience caused by the insect is very slight. We had no cases among ourselves or our natives serious enough to prevent marching.

Patches of tsetse fly were found to be numerous in most of the country explored by the expedition north of lat. 14°, and also on the western bank of the Lunga and Kafue rivers as far south as the mission station at Nkala. There is also "fly" directly south of Nkala, between Nanzela and the Zambezi. I had hoped that, by making careful inquiries from the natives, the expedition might avoid "fly," but after crossing the Kafue for the second time, I found that native information on this subject was so unreliable, and that the "fly" belts were so large, that it was impossible to avoid the "fly." Therefore I pushed on in any direction that I wanted to explore, determining to get as much use as possible out of the stock before the "fly" killed them. The mortality of the expedition's stock was very much less than my previous experience of tsetse fly had led me to expect. This fact, and native reports and opinion on the present power of the "fly," have convinced me that the "fly" in this particular part of Africa is not such a fatal pest as it used to be before the rinderpest killed the buffalo. The natives repeatedly told us that since the rinderpest the fly no longer kills, and that they now take their dogs with them on hunting-trips with impunity. This story was repeated with variations. Muyanga was said to have made medicine and killed the "fly." Another story told us in that neighbourhood was that, since the "fly" had taken to biting women, it did not kill cattle. One way and another, we found a universal belief among the natives that the tsetse fly had lost its power.

The domestic animals which the expedition took across the Zambezi were 5 horses, 2 mules, 5 oxen, 67 donkeys, and 9 dogs. Of these three horses died, all probably, two certainly, from the results of fly-bite. Fourteen of the donkeys died from accident or other causes, but none, in my opinion, from the results of the tsetse fly. The mules, oxen, and dogs were unaffected by the "fly."

The explanation of the decrease of the fly disease in spite of the existence of the "fly" is possibly in the fact that the rinderpest was

in 1895 so severe in that part of Africa north of the Zambezi, that the buffalo, which existed before in great numbers, is now nearly extinct. Other kinds of game still exist in fair quantity, but the buffalo, which is generally found in connection with the tsetse fly, has disappeared. Surgeon-Major Bruce, by his investigations in Pondo Land, has proved that the tsetse fly is not the author of the disease which destroys domestic animals bitten by it, but only transmits the germ of a disease always existing in, but rarely, if ever, fatal to the wild animal. Possibly this disease is mainly confined to the buffalo, and does not exist to any great extent among the various species of antelope which are left. Hence the partial disappearance of the disease.

Most of North-Western Rhodesia is a good game country. Practically no shooting was done by the expedition, except for purposes of food, but there was seldom any difficulty in keeping up a good supply of meat. Eighteen varieties of antelope were killed, besides zebra, pigs, hippopotamus, buffalo (one only), and six lions. Elephants exist in the northern part of the Kafue basin. I nowhere saw evidence of large numbers. In one instance I saw the spoor of a herd of about a hundred to the west of the Lunga river, but, with this exception, the tracks I saw indicated troops of not more than ten. The natives near the Congo Free State are very well provided with muskets, and continually hunt the elephants. I saw in several places remains of freshly killed elephants. Unless regulations for their protection are strictly enforced —a matter of considerable difficulty—the elephant will in a few years disappear in this district, as it has elsewhere, only in this case it will be exterminated by the native without the help of the white man.

INTERNATIONAL OCEANIC RESEARCH.

The Conference at Stockholm in June, 1899, the report of which was summarized in the *Journal* for December, 1899 (vol. xiv. p. 646), was to have been followed by a second Conference in the autumn of 1900, but this did not actually come together until May of the present year. Representatives of eight nations—all of those bordering the North Sea and Baltic with the exception of France—met at Christiania, on the invitation of the Norwegian Government, on May 6, the meetings continuing daily until May 11. The Conference was officially announced as "for the exploration of the sea," but the proceedings were conducted on the understanding that the exploration in question was to be carried out strictly with a view to practical results, especially as regards fisheries. Sweden sent six delegates, including Profs. Pettersson and Cleve, Dr. Wijkander, and Mr. Ekman; Germany sent five, including Dr. Herwig and Prof. Krümmel; Great Britain sent four, Sir Colin Scott Moncrieff, Permanent Under-Secretary for Scotland, Prof. D'Arcy

Thompson of Dundee, Dr. H. R. Mill, and Mr. W. Garstang, of the Marine Biological Association at Plymouth; Denmark sent three delegates, including Captain Drechsel and Dr. Martin Knudsen: Belgium sent two; Norway two, Prof. Nansen and Dr. Hjort, to whom Profs. Mohn and G. O. Sars were added in a consultative capacity; and one delegate was sent from each of the remaining countries, Russia, Finland, and Holland, the last-named country being ably represented by Dr. P. P. C. Hoek.

The work consisted in the revision and completion of the Stockholm programme. The oceanographical section, having been very fully elaborated at Stockholm, was adopted with only a few trifling alterations and additions; but the biological programme was completely recast and brought into a form that commended itself to the Conference as thoroughly practical.

The most interesting feature, from the geographical point of view, is the suggested alteration of the proposed "spheres" of the different nationalities engaged on the joint work. Instead of the somewhat patchy areas allocated to the participating nations in the map published in 1899, it is now proposed that in the North Sea south of 58° N., the whole area west of 2° E. shall be allocated to Great Britain, while to the east Belgium, Holland, Germany, and Denmark will be responsible for the sea lying off their own shores.

From 58° to 62° N. the investigation of the North Sea and North Atlantic will be shared by Great Britain, Norway, and Denmark, while the North Atlantic farther north and the Arctic Sea will be investigated by Norway and Russia. The Skagerrak and Kattegat are assigned to Norway, Sweden, and Denmark; the western Baltic to Germany, Sweden, and Denmark; the southern part of the eastern Baltic to Germany; and the northern part, including the gulfs of Finland and Bothnia, to Sweden, Russia, and Finland. These divisions are intended to ensure that each nation will be responsible for certain definite areas, and that none shall be left out, but it is distinctly stated that "the suggested boundaries are not intended to hinder any nation from extending its researches beyond the special areas agreed upon."

The new programme for biological work is divided into three sections, dealing respectively with the Biology of Food-fishes, Plankton and Bottom Fauna, and Fishery Statistics. Under each head there are numerous paragraphs specifying the minimum requirements of the international scheme and the optional extensions which are desirable to be made if circumstances permit. In every case it is urged that the distribution of fish, fish-food, deposits, etc., should be ascertained with sufficient detail to permit of charts being drawn.

In order that the programme may be of service, there must be a proper organization for directing the work and funds, as well as ships for carrying it on. It is understood that the participating nations, by

the fact of their participation, agree to contribute the funds required for administration, and several of the countries—especially Norway, Russia, and Germany—have had special vessels built for carrying on their share of the researches. The other nations will, it is hoped, also arrange for an adequate equipment with which to carry on their share of the work, which, although scientific in plan, is purely practical in aim.

The Conference recommends that the participating nations should appoint an International Council consisting of two representatives of each country with full powers, that this Council should meet as soon as possible at Copenhagen and proceed to appoint the *personnel* of the Central Bureau, which shall carry out the arrangements for international co-operation, and of the International Laboratory. Both the Bureau and the Laboratory shall be permanently under the control of the International Council, but it is suggested that they should be independent of each other, and the proposals of the Conference are even compatible with the two being in different countries. A statement made in the Norwegian and German press that the Central Bureau will be situated in Copenhagen, with Dr. P. P. C. Hoek as secretary, and the International Laboratory at Christiania, with Dr. Nansen as director, is obviously premature, since the appointment of the staff can only be made by the International Council, which has not yet met. The official report of the recent Conference affords no confirmation of these rumours.

The work of the Central Bureau will be mainly administrative and editorial; a considerable part of its duties will consist in the elaboration of statistics. The International Laboratory, on the other hand, will be concerned with the supply of uniform, tested apparatus to all the participating vessels, research into methods of working, and the instruction of the assistants who will carry out the work on board the different ships, the analysis of samples of water collected on the expeditions, and the supply of apparatus to the participating states at cost price.

The Conference passed a resolution stating that it considered that the provision of a steamer specially constructed for scientific fishery researches by each of the countries concerned was absolutely indispensable. It also pointed out that it was very desirable that the Central Bureau should commence operations at latest by the beginning of 1902, and that the first of the quarterly simultaneous international cruises should take place not later than May, 1902.

The last of the resolutions runs as follows:—

"In distinct areas of the sea, as for example the Moray firth, in which any government has undertaken scientific experiments in the interest of the fisheries, and in which the success of the experiments is being hindered by the operations of trawlers, it is to be desired that measures be adopted for the removal of such hindrances."

This points to a difficulty arising from a curious anomaly in the political geography of the sea. Every nation has full power over all ships sailing or fishing under its flag, wherever they may be, and it can also enforce police regulations with regard to vessels of any nationality within the 3-mile limit from shore which bounds territorial waters, but not a yard beyond. For many years British trawlers have been excluded from the Moray firth in order to see whether by so doing the fish-supply, which had been rapidly declining, would revive; but as a great part of the forbidden area is more than 3 miles from land, it has become a happy hunting-ground for trawlers under foreign flags, and of course it is impossible to test the value of prohibiting trawling in such conditions. The guarded expression of sympathy with the difficulties arising from this state of matters will, we may hope, facilitate international arrangements for obviating the trouble which now frequently occurs, not only in the Moray firth, but in other waters where it may be British vessels are sometimes tempted in their turn to cross boundaries forbidden to the native fishing fleets.

KANT'S COSMOGONY—REVIEW.*

Prof. Hastie has conferred a favour on those English students of astronomy and physiography who are not proficient in any language but their own, by his careful translation of the works of Kant relating to Cosmogony, and by his very able Introduction. He reminds us that Kant was a man of science first, a philosopher and metaphysician afterwards, and he puts in a remarkably clear light the contrast between the nebular hypotheses of the origin of the solar system and of the universe put forward by Kant and Laplace, hypotheses which writers of reputation—more familiar, probably, with the titles of the works of these originators than with the works themselves—have very frequently confounded or treated as identical.

From the nature of the treatises selected for translation, the work naturally lies in great measure outside the scope of geography, however widely that too elastic term may be stretched; but the arguments in the memoir on the retardation of the Earth's rotation are essentially geographical. The idea of tidal friction familiarized by the calculations of Lord Kelvin, Prof. Tait, and Prof. Darwin, and popularized in an almost startling form by Sir Robert Ball, is here shown to be no novelty of the later nineteenth century, but to have been presented with admirable clearness in the year 1754.

* 'Kant's Cosmogony as in his essay on the Retardation of the Rotation of the Earth, and his Natural History and Theory of the Heavens,' with Introduction, Appendices, and a Portrait of Thomas Wright, of Durham. Edited and translated by W. Hastie, D.D. Glasgow: James Maclehose & Sons. 1900.

Prof. Hastie refers at several points to the interest which Kant took in physical geography, but it was not part of his design to treat this fully. It is, however, a matter very well worthy of being treated, and we hope that an author who has proved himself so much in sympathy with the mind and methods of this great scientific organizer, and so competent to handle his views in the light of the most recent advances of science, will not ignore the "Physical Geography."

Kant's system of geography was elaborated with a logical completeness far in advance of the mere knowledge of facts in his day, and perhaps in ours. If it had not been lost sight of—drowned, we might almost say, in the flood of discovery which it ought to have controlled—it is possible that we would not now be confronted with the disgraceful antithesis of "geography and science," or troubled by the lurking suspicion that perhaps, after all, the geographer may deserve a lower place than say the physicist or biologist in the hierarchy of natural knowledge on account of some intrinsic demerit in his methods.

ADMIRALTY SURVEYS DURING THE YEAR 1900.

UNDER the orders of the Lords Commissioners of the Admiralty, seven of His Majesty's vessels, with three small hired steam-vessels, manned by 66 officers and 629 men, have been employed on hydrographical surveys on the home and foreign stations.

The following is a brief summary of the work accomplished, as detailed in the report prepared for presentation to Parliament:—

Reports of 272 rocks and shoals, which were dangerous to navigation, have been received at the Hydrographic Department, and were notified to the public by notices to mariners; 1167 miles of coast have been charted, and an area of 10,733 miles has been sounded.

On the south coast of England:—The bar of Portsmouth harbour was resounded; the general depths were found to be 29 feet, or 1½ to 2 feet greater than in 1897. The bar is mainly formed of shingle, and was deepened in 1894 to 29 feet.

There were found some very remarkable deep holes with as much as 35 feet in them, which bear eloquent testimony to the force of the scour of the tide, and to the movable character of the material forming the bottom.

The present depths show that the force of the stream is working mainly on the bottom.

Fowey harbour was resounded after the recent dredging operations.

The bay and bar of Salcombe river were resounded.

The survey of Dartmouth harbour was completed.

The examination of the dredging at the Cremill shoal by sweeping was completed, a depth of 30 feet being obtained. This, with the removal of the Vanguard and Bubble shoals, completes a great improvement of the entrance to the Hamoaze.

On the east coast of England:—The survey of the Orwell river from Pin Mill to Ipswich was completed. The Shingles Patch was resounded; it is still slowly growing in height and area.

The survey of the lower portion of the Humber river was completed.

The triangulation and coast-line between Scarborough and the terminal point of the survey of the Yorkshire coast off Whitby in 1898, was begun, but, on account of the prevalence of misty weather, was not completed.

A survey of the river Stour was begun.

The river Tyne was resounded between the eastern end of Jarrow lake and a point just beyond Messrs. Armstrong's works at Elswick.

On the west coast of England:—The survey of the approaches to Barrow-in-Furness was begun, but not completed.

On the west coast of Ireland:—The survey of Blacksod bay was completed.

The river Shannon was examined and a shoal not previously charted was found, but the changes since the original survey in 1841 are small. Bantry and Glengariff harbours were resounded.

A survey of Kinsale harbour was finished.

An examination of Kenmare river was made. The discovery of two small shoals reveals that a more exhaustive survey is required.

On the east coast of Ireland:—The report that the Maiden rocks off Larne harbour caused serious local magnetic disturbances was investigated, and no such effect was found.

On foreign and colonial shores:—In Newfoundland a thorough search disproved the existence of a rock shown on the charts to the westward of Belle Isle for 140 years. It has now been removed from the Admiralty charts.

The survey of Canada bay was completed.

A triangulation between Partridge point, St. Barbe islands, and Gull island lighthouse was made to enable this part of the coast to be adjusted to the recently-made survey of White bay.

In Notre Dame bay the whole area between Sunday Cove island, Tickle and Badger bay was surveyed; a plan was also made of Pilley island harbour.

On the west coast of Africa:—The survey of the west coast of Cape Peninsula from Cape Point to Lion's Head was completed.

On the east coast of Africa:—The outer anchorage at Durban, Natal, was resounded.

The Pungue river was surveyed. This survey was much needed, as the port has rapidly advanced, and is now of much importance in connection with the trade of Rhodesia.

Closely sounded plans were made of Zanzibar harbour. A chain of magnetic observations for variation made at sea off the coast showed that considerable alteration has taken place of late years, in the rate of change of this important magnetic element.

On the coast of Arabia:—The coast was surveyed from Perim to Ras Kaau.

On the west coast of North America:—Surveys were made of Discovery passage, Johnstone strait as far west as Jesse island, and large-scale plans of Seymour narrows, Gowlland harbour, Elk bay, and Otter cove.

The triangulation of the Straits of Georgia was also finished.

On the north coast of Australia:—Unsuccessful searches were made for the following reported dangers: Two areas in the Gulf of Carpentaria, Indus reef, Lyner reef, El Dorado rocks, and Squaw reef (so often looked for by other surveying vessels).

Money shoal, Marie shoal, two reefs situated south-east and south-south-east of Cartier island, together with Browse island and its vicinity, were examined and charted.

On the west coast of Australia:—The survey was completed from north-west cape to Ashburton roads. Monte Bello islands and Ritchie reef were surveyed.

Passage islands and Meda reef were surveyed.

On the south coast of Australia:—Recherche archipelago was surveyed from Cape Le Grand to Middle island and Pollock reef.

Plans were also made of Duke of Orleans and Goose or Middle Island bays. A line of deep-sea soundings was obtained from Albany to Tasmania.

On the east coast of Australia:—In Queensland the survey was resumed inside the barrier reefs, and completed from Princess Charlotte bay to Cape Melville, including the portion of the route from Dhu reef to King island and Bathurst bay.

A 3-fathom shoal, supposed to be identical with the "Wikengen" reef, was found in Princess Charlotte bay. Two unsuccessful searches were made for the reef reported by the s.s. *Karaweera*.

In China:—Two unsuccessful searches were made for rocks reported by s.s. *Esmeralda* and *Sokotra*. A survey was made of the Shaweishan or north channel into the Yangtse river, and a good channel was found, which has been used by the *Centurion* and other battle-ships. An area of 750 square miles of the banks north of the Yangtse Kiang was sounded.

The survey from Hong Kong to Canton river was commenced and completed from the Brothers to Yau-i-chau, including 70 miles of coast-line.

In India:—The survey between Honowar and Kundapur was completed. The survey of the coast between Madras and Cuddalore was completed. The survey of the coast between Kundapur and Mangalore was taken in hand, and is still in progress.

Magnetic observations and trawling operations have been carried out as occasion offered.

During 1900 the Hydrographic Department has published 102 charts and plans; 30 plates have been improved by the addition of 38 new plans; 224 plates have been largely improved by corrections and additions; 35,500 have received corrections at the hands of the draughtsmen.

The number of charts printed for the requirements of the Royal Navy, for Government Departments, and to meet the demand of the general public, has during 1900 amounted to 580,207.

THE MONTHLY RECORD.

EUROPE.

The Glens of Ayrshire.—A reprint has lately been issued from the *Annals of the Andersonian Naturalists' Society* (Glasgow, 1900) of a paper on the "Drift-filled and Post-glacial Glens of Ayrshire," in which the author, Mr. J. Smith, traces the changes which have taken place in the course of various river-channels during and since the glacial epoch. His attention was directed to the subject by noticing the frequent alternations in the course of the streams between banks of drift and perpendicular walls of rock, the latter forming deep narrow gorges. Further examination proved that these rocky gullies were clearly post-glacial, while to one or other side of them there was generally a drift-filled channel or glen. This is explained by the writer by the filling up, during a period of subsidence, of the pre-drift glen, so that on the re-emergence of the land the stream has commenced to cut a new channel laterally to its original course, thus forming a rocky glen outside the limits of the drift. The bottoms of the old glens appear in most cases to remain covered with drift, few Ayrshire streams running in the lowest part of these. Although there are a number of rock-bound hollows in the county,

the rocky gorges have not been cut through barriers to such hollows. The author specifies a large number of cases in which the above-mentioned changes have occurred; the new glen being in some cases entirely removed from the drift-filled channel, in others, as in the case of the Dunnach Burn, having drift-beds on one side and a glaciated rock-bank on the other. It is stated to be, apparently, a rule that the older the formations are, the fewer are the post-glacial glens cut in them, the reason assigned being that, the original valleys being deeper, the streams would be the easier guided back into them. The paper ends with an attempt to sketch the physiography of Ayrshire before the Glacial period.

Glaciation of the Southern Carpathians.—The *Comptes Rendus* contains a further note by M. de Martonne on the progress of his examination of the glacial phenomena of the Transylvanian mountains. During the summer of 1900 M. de Martonne explored the southern boundaries of the mountains, including the Cerna, Lotru, and Fogaras, and the *massif* of the Czukas. Two main conclusions are stated. First, the snow-line descends rapidly from east to west, from above 1900 metres in the Czukas to 1600 metres at the other extremity of Wallachia. This result, which agrees with that recently obtained by Penck and Cjivic in the Balkans, seems to hold good for Europe generally, and its significance can scarcely be over-estimated. Second, in the *massifs* where the glaciers have attained the lowest levels (the Cerna) the moraine deposits are little disturbed, while in those where the glaciers terminated at higher levels they have suffered considerable erosion. The finest examples of *roches moutonnées* are observed in the regions where the search for morainic deposits is least successful, while they are rarely discovered under glacial *débris*, a point of interest as indicating the nature of the process of erosion in gradually obliterating traces of glacial action.

Seiches in the Sternberger See.—Herr H. Ebert contributes a paper on seiches to the *Sitzungsberichte* of the Munich Academy of Sciences. The author proposes to make an extended series of observations in the Bavarian lakes, and has begun with the Sternberger See, which is remarkable for simplicity of outline. A Sarasin limnometer was employed. The observations disclose the existence of a well-marked seiche of typical form, with simple vibrations, in accordance with Forel's theory, having a period of 25 minutes. This is a wave of the full length of the lake, having opposite phases at the two ends, and a nodal line crossing the lake at Tutzing. Another wave, having a period of 15¾ minutes, is superposed, forming a period between quint and sixth; but the period of both is independent of the amplitude. Sudden changes of barometric pressure are the most powerful meteorological agences causing these seiches.

Fishery and Marine Investigations in Norway.—The first volume of 'Reports on Norwegian Fishery and Marine Investigations' has been published by the Norwegian Home Office and the Trustees of the Fridtjof Nansen Fund, under the editorship of Prof. Hjort. It contains the results of investigations carried out during the years 1897–99, with the primary objects of ascertaining the influence of ocean currents on the Norwegian fisheries and the life-history and distribution of the fry of fishes at certain selected points on the coast; and it forms a complete account of the work done in Norway from the time when fishery investigations were first actively taken up by the Government, until they were organized on the larger scale upon which they are being now conducted, and the special steamer *Michael Sars* was built. Eight papers on methods and results of physical and biological research make up the volume. The authors and short titles are as follows: (1) "Fishing Experiments in Norwegian fjords," by Johan Hjort and Knut Dahl; (2) "Hydrographic-biological Investigations in the Skagerrak

and the Christiania fjord," by Johan Hjort and H. H. Gran; (3) "Account of the Post-embryonal Development of *Pandalus borealis*, etc.," by G. O. Sars; (4) "Decapods collected during the Investigations," by Alf Woellebaek; (5) "Hydrographic-biological Studies of the Northern Ocean and the Coast of Nordland," by H. H. Gran; (6) "On the Determination of the Salinity of Sea-water by its Powers of Refraction," by Hercules Tornøe; (7) "Synopsis of the Norwegian Marine Thalamophora," by Hans Kiaer; and (8) "Chemical and Micro-biological Investigations on the Curing of Herring," by Sigval Schmidt-Nielsen. The fishery investigations, which refer chiefly to the Skagerrak, the Christiania fjord, and the Trondhjem fjord, have already yielded valuable practical results. The disproportion observed between the abundance of the older stages of fish with pelagic eggs which spawn in the fjords and the scarcity of fry in the fjords is explained by supposing that the strong outflowing current during the spawning season removes the pelagic eggs from the fjords and the south coast of Norway, thereby preventing the bulk of them being hatched before reaching the waters of the coast. The sudden appearance of the fry in the fjords during autumn is regarded as an immigration. This result is one of far-reaching importance, and if it can be shown to be of general application, it must considerably modify the direction hitherto taken by fishery investigations, for it involves the overthrow of the doctrine that the edible fishes spend their whole lives in one locality, and form local tribes or races. If the fish producing pelagic spawn are to be regarded as belonging to one tribe common to a whole coast, it follows that the protection of fry at one spot will benefit all that coast, and the destruction of fry at one spot can be made good from another. The destruction of fry by the use of improper fishing apparatus must therefore be prohibited where it is most abundant and not, as hitherto, where it is most scarce. In the second paper the authors extend the result already published by them in co-operation with the Swedish hydrographers in the memoir "Skageraks tilstand," that the failure of the herring fishery in the Skagerak during the winter of 1896–97 was due to meteorological causes, and add a great deal of new matter about the Christiania fjord and its branches. Specially interesting is the discovery of quantities of sulphuretted hydrogen in the "dead water" at the bottom of the Frier and Drammen fjords, a condition only known to exist in the Black sea. The fifth paper, by Herr Gran, has perhaps the greatest general geographical interest. The first part of it, on the North Atlantic, deals chiefly with the relations between the northward-moving waters from lower latitudes (still unfortunately called "Gulf Stream") and the East Icelandic polar currents. The invaluable researches of Hjort on board the *Heimdal* during the winter of 1896–97, and the observations of the s.s. *Westye Egeberg* in 1898, are fully discussed and brought into relation with the work of Pettersson, Wandel, Knudsen, and others. It seems a pity that in connection with this subject, and particularly with reference to the regions west and north of the British Isles and the North sea, the author has not made use of the considerable amount of work done in this country during recent years. Prof. Tornøe describes a modification of Hallwach's differential prism, and gives the results of trial determinations of salinity. The instrument employed, however, is still in the experimental stage, and has not yet been actually used at sea.

ASIA.

Exploration of the Wady Mojib (Arnon River).—In an article published in the *Quarterly Statement* of the Palestine Exploration Fund, January, 1901, the Rev. Putnam Cady gives an interesting account of a boat-journey he made in February, 1898, along the east coast of the Dead Sea to the Wady Mojib, or river Arnon, which had apparently not been explored since Lieut. Lynch's expedition

in 1848. His observations have led him to correct several statements made by Lieut. Lynch. Soon after leaving the Jordan a strong current was noticed setting towards the north, which was observed all the way down the coast. Cliffs line the shore for the greater part of the distance, with but few landing-places. Before reaching the Callirrhoe, many streams of hot water were observed flowing down the mountains. Oil poured out from the rocks and covered considerable areas of the sea. The Arnon enters the sea through a chasm about 100 feet wide, which runs east for 450 feet and then turns sharply to the south. An immense delta extends out into the sea several hundred feet. The river, which has a very rocky channel, was with difficulty explored to a point where the chasm is only 4 feet wide, further progress being stopped on the brink of an apparently large waterfall. A curious phenomenon mentioned in connection with the Dead Sea was the sudden breaking of heavy waves on the shore, which, we are told, occurred on three successive nights at about 7.30 when no air was stirring, and lasted for an hour. In a note appended to the article, Major-General Sir Charles Wilson points out that this may perhaps have been something in the nature of the *seiches*, or disturbances of level, to which the Lake of Geneva is subject. The article is illustrated from photographs taken by the author.

Exploration of the Sea of Aral.—A thorough investigation of the Sea of Aral has been undertaken on behalf of the Turkestan branch of the Russian Geographical Society, by L. S. Berg, who has described the work carried out during the first season in the *Zemlevedenie* for 1900. A short account also appears in *Globus* for the present year (p. 213). The expedition set out from Kasalinsk on June 16 (? 1899) for the delta of the Syr Darya, where the topographer Molchanoff remained to execute a survey of the whole delta and the adjacent parts of the lake. On June 25 the expedition commenced the navigation of the lake, visiting the little-known islands of Barsa Kilmes and Nikolai, and afterwards landing on the west coast, where a geological examination of the Ust Urt plateau was carried out. After further explorations on the north-west shore of the lake, the leader returned to Kasalinsk, but shortly resumed work by an examination of the seiches on the lake. Extensive meteorological, hydrographical, and biological observations were also made, the depth in the centre being found to be 70 to 80 feet, while along the steep west coast depths reaching a maximum of 205 feet were obtained. The salinity was found to be very slight, but the water was extremely transparent, objects being visible to a maximum depth of 77 feet. Indications of a considerable rise in the level were noticed, whereas down to 1880 all travellers spoke of a rapid drying up of the lake. Marks were left to facilitate a future comparison of levels.

The Morphology of Transbaikalia.—The construction of the Siberian railway has involved a careful study of this region, and led to a more detailed knowledge of its physical features and structure, which alters a number of current conceptions. The great chain of the Yablonoi mountains, running from the south of Lake Baikal to the Sea of Okhotsk, can no longer be drawn on our maps in this way. Mr. Obrucheff, who superintended the explorations east of Lake Baikal, gave an outline of the results attained to the Seventh International Geographical Congress at Berlin (*Verhandlungen*, pp. 192–206). The valley-lines of the Chikoi-Ingoda-Chita separates a western from an eastern region. Western Transbaikalia rises to about 4000 to 4600 feet, with valleys which deepen from about 2800 to 3100 feet in the east to 1600 to 2800 feet in the west. They are rounded hills with wide water-partings and broad valleys more or less marshy. There are many forests of larches in the east and of pines in the west. Everywhere the scenery is like that of the Harz or Black Forest rather than that of the Alps. There are

five ranges almost parallel to each other, and striking from W.S.W. to E.N.E. The eastern ranges, commonly known as the Yablonoi in the narrower sense, Mr. Obrucheff calls the Malkhan mountains. They curve to the north-east in the east, and cease to form the divide between Arctic and Pacific flowing rivers. The Eastern Transbaikal or Nerchinsk plateau resembles the more deeply dissected western part of the western region, with crests about 4000 to 4250 feet and valleys from 1650 to 2800 feet. In the south-west the land, however, rises above the tree-line to 8200 feet in Sokhondo. Eight more or less parallel ranges can be traced, also striking from W.S.W. to E.N.E., abutting against the Great Khingan, whose spurs can be found west of the confluence of the Argun and Shilka. Precambrian metamorphic schists are wanting in the north-west of Transbaikalia, which must have been a continental mass since earliest times. Palæozoic rocks do not occur in the western three-quarters of the region, and marine mesozoic and tertiary deposits are absent altogether, so that the plateau has been land since palæozoic times. Although from the ordinary map one might infer that this is a typical folded mountain region, the feature-lines are due to fractures and the igneous outflows that accompanied them.

Journey in Borneo.—In a letter written from Long Bluëe (*Tijd. van het K. Nederl. Aardr. Genootschap*, No. 3, 1901), Dr. Nieuwenhuis describes a journey to the Sarawak frontier. He ascended the Makaham with a steamboat to the mouth of the Rata (steamers usually stop at Uju Tepu), and with the assistance of the Kayan chief, Kwing Irang, passed the falls and reached the source-region of the river. Here he ascended the Lasan Tuyan, 3600 feet high, the highest point of a ridge running northwards, over which a route descends to the Nyangeyan, a tributary of the Batang Rejang. Directly eastwards a range was seen culminating in a conical peak more than 6500 feet high. This was the Batu Tibang, the "central point of the earth" of the Bahaus. An examination of pebble-banks on the left-hand tributaries of the Mahakam proved its volcanic character. The water-parting range of the upper Kapuas extends into the basin of the upper Mahakam, on the whole in an easterly direction, and is interrupted by the volcanic highlands dominated by Batu Tibang. Here begins the basin of the Kayan river. The boundary with Sarawak is formed by the watershed between the Mahakam and Nyangeyan, consisting of a ridge 2300 to 5200 feet above sea-level.

The Poigar River, Celebes.—The Poigar river is, after the Dumoga, the largest river of Bolaäng Mongondo, a district near the eastern end of the great northern peninsula of Celebes. It rises in the Moöat lake not very far from the east coast, and flows north-westwards to the Celebes sea, which it enters at lat. 2° 10′ 6″ N. and long. 124° 10′ 2″ E. From a height of 3300 feet it falls over a series of steep slopes, with stretches of deep still water between, to the lake Iloloi. On either side are wooded mountains, and on the left bank, south of Iloloi, there are several hot springs. Both the river and the Iloloi lake, which is but an expansion of the river, abound in fish, especially eels as thick as a man's arm, and waterfowl are exceedingly plentiful. A few miles from the left bank of the Moöat lake rises the extinct volcano Ambang, and the country around is covered with volcanic ash. An island named Pasig stands on the lake. Hills surround it, except on the west side. The mouth of the Poigar river marks the boundary between Bolaäng, Mondongo, and Minahasa, and derives its name from the young leaves used to mark boundaries. The river was surveyed in 1899 under the direction of Mr. W. J. Pet. A map and views of the lake Moöat are published by Dr. Riedel in the *Tijd. van het K. Nederl. Aardr. Genootschap*, No. 2, 1901.

Timor and Roti.—The commission of 1899, appointed to delimit the Dutch

Portuguese boundary in Timor, came to the conclusion that the south coast of the island was very inaccurately represented on existing maps. Again in 1900 the *Siboga* sailed to the south coast in search of the Pearl bay of the English Admiralty charts, which, indeed, does not exist, and the survey then made confirmed the observations of the commission (cf. *Journal*, vol. xvi. p. 112). From the south-east and north-east the coast gradually trends inwards, so that the breadth of the island where the boundary crosses it is only about two-thirds as large as hitherto shown. The boundary-post on the coast beside the Talus river stands in lat. 9° 29′ 20″ and long. 125° 5′ 30″. Some few inaccuracies have also been discovered on the north coast. In Rotti, the chief point ascertained is that the Landu district on the north is a peninsula of Rotti, and not a separate island. Travellers have spoken of riding from the mainland into Landu, but their statements appear to have been overlooked (*Tijd. van het K. Nederl. Aardr. Genootschap*, No. 2, 1901).

AFRICA.

Navigability and Water-supply of the Nile.—A visit of inspection to the upper Nile has lately been made by Sir W. Garstin, who extended his journey southward as far as Gondokoro. The work of cutting through the *sudd* was continued last winter by Lieut. Denny at the southern end of the marshy tract, and there now remains a space of only 23 miles to be cleared of the obstruction. The portions of the channel opened last year by Major Peake have remained clear, and show no signs of renewed blocking. South of Gondokoro navigation is not yet possible, owing to the extremely low state of the river. The rains in the equatorial region have, however, set in unusually early, and a marked rise has already been reported from the Victoria Nyanza, so that an improved state of things may soon be expected. The opening of a continuous channel will not immediately prevent the loss of water to which the Nile is subject during its passage through the region of swamps. In order to effect this, the creation of firm and well-marked banks to retain the water within a definite channel will be necessary, and this has lately been engaging the attention of the Egyptian authorities. The restriction of the stream within a single channel will also have the advantage of increasing the rate of the current, so that in future blocking by means of sudd will be practically impossible. It is pointed out in the *Mouvement Géographique* that the re-opening of the Nile route will prove of great service to the north-east portion of the Congo State, for which it will soon prove the quickest route from and to Europe. Several Belgian officers have already made use of the Nile route, and it is pointed out that by this means the journey from Brussels to Rejaf can be performed in less time (eighteen to twenty days) than the voyage from Antwerp to Matadi.

A Fossil Sea-urchin from the Sahara.—M. de Lapparent has lately called attention, both in the *Comptes Rendus* of the Paris Academy of Sciences (vol. cxxxii. p. 388) and in *La Géographie* (April, 1901), to a fact which has been brought to light by him, and which has an important bearing on the geological history of the Sahara. The unlooked-for discovery has been made that a fossil brought home by Colonel Monteil from a spot in the very centre of the Sahara, in 18° 23′ N., not far from the Bilma oasis, represents a marine organism, probably of cretaceous age. M. de Lapparent's attention was directed to the subject by the statement of Rohlfs that fossils existed on the caravan route between Bilma and Agadem, and, mentioning the subject to Colonel Monteil, he learnt that a stone apparently bearing the imprint of an animal of radiate form had been picked up by him in the same district. On examination by M. V. Gauthier the specimen was pronounced to belong to a genus of Echinidæ lately established by an Indian Government geologist under the name Moetlingia, on the basis of a specimen from Baluchistan,

which is proved to belong to the upper cretaceous. M. de Lapparent points out how this discovery must modify existing views as to the geological history of the Sahara, by proving that in cretaceous times the portion in question was covered by the sea. A connection seems to have existed between this Saharan gulf through Lower Egypt, Palestine, Persia, and Baluchistan, with the Indian ocean, the biological conditions throughout this whole area favouring the existence of large sea-urchins and great quantities of ammonites. In our present entire ignorance of the geology of the region between Lake Chad, the Cameroons, and the Congo, M. de Lapparent shows that it is quite open to us to suppose that this Saharan gulf may have communicated with the seas which at that epoch washed the shores of the Gabun and Shoa. In any case, a rich harvest of results awaits the geological investigation of this region.

Expeditions in Abyssinia.—It is announced in the *Mouvement Géographique* that a Belgian expedition to the south of Abyssinia has been organized by the company which has been formed in Belgium for the exploitation of the southern provinces. Its leader is the Baron de Chedeuvre, who was a member of Count Leontieff's expedition to Lake Rudolf in 1899, and who sailed from Marseilles for Jibuti on June 3. A small steamer, to be named the *Menelik II.*, will be taken out in sections, to be launched on Lake Rudolf. A French scientific expedition has also lately proceeded to Abyssinia under M. Dubourg, and we learn from the *Politique Coloniale* that news of its arrival at Harrar has already been received. Early in May it was about to continue its route southward for the country of the Arussi Gallas.

Waterway on the East Coast of Madagascar.—The east coast of Madagascar is fringed, as is well known, for long distances by a series of lagoons and channels separated from the sea by narrow islands and banks of sand, now covered with vegetation. Although navigable for considerable distances, these channels are here and there interrupted by ridges of sand and clay known as "Pangalanes." The unsheltered nature of the outer line of the coast rendered it of special importance that this interior system of waterways should be improved and developed, and this has been accomplished since the French occupation by the opening of a continuous channel from Ivondro, a little south of Tamatave, to Andevoranto, the starting-point on the coast of the road and railway routes to the capital. An account of this undertaking, with illustrations and a sketch-map of the canal, is given in the *Tour du Monde* for June 15. Within the interval in question three separate ridges have had to be cut through, with a total length of nearly 3500 yards, involving the removal of some 800,000 cubic yards of material, not including that dredged from the intermediate sections of the canal. The depth of the latter varies from 5 to 6½ feet. The total length of the canal, which has been executed by private enterprise, is 80 miles. It is intended eventually to extend it to Tamatave, but in the mean time a short line of railway connects its northern extremity with that port.

German East Africa.—The Foreign Office Report on German East Africa for 1900 (Annual, No. 2568, 1901) contains several matters worthy of note. According to the census taken on January 1, 1900, the white population numbered 1078. Details are given regarding the agricultural and other products of the country. Tea is said to grow well, but up to the present has only been planted in small quantities; the export of coffee is increasing, and the cultivation of fibre is likely to be profitable. The extensive mangrove swamps which line the mouths of the Rufiji river produce a species of timber known as *boriti*, or Zanzibar rafters, much used in the building of native houses, and which is exported to Zanzibar,

Arabia, and India. Several important alterations in the steamship services are noted. The survey for the telegraph line from Dar-es-Salaam to Kilossa has been completed; it is hoped that this line will be continued to Ujiji. Progress has also been made with railway surveys during the year. The Usambara Railway was bought by the German Government from the German East Africa Company in March, 1899, and the sum of £115,450 was voted for the continuance of the line from Muhesa to Korogwe. The survey from Muhesa to Korogwe has been completed, and the 87 kilometres of line from Tanga to Korogwe will probably be opened for traffic on July 1, 1901. With regard to the proposed Central Railway from Dar-es-Salaam to Mrogoro, only the first 50 kilometres to Kola have been definitely surveyed. A trigonometrical survey of East and West Usambara has been made, and a map of the former (Handei) is about to be printed. Much topographical work has also been done in various parts of the colony, notably in Uhehe (Hauptmann von Prittwitz), in Usagara (Dr. Stuhlmann), and between the Tanganyika and Nyasa lakes (Dr. Kohlschütter). The frontier between the British East Africa Protectorate and German East Africa has now been finally settled. We learn that valuable work is at present being done by Dr. Busse, who is making a study of all the plants indigenous to the country. The rainfall registered throughout the colony during the year under review was in excess of 1899. Brief descriptions are given in the Report of the twenty-one districts into which German East Africa is divided. The gross value of the goods imported and exported during the first half of 1900 shows a decrease of £25,000 and £1000 respectively when compared with the returns for the same period of 1899.

Planting Experiments in German South-West Africa.—Attempts have recently been made with some success to improve the vicinity of Swakopmund, the port of German South-West Africa, by the introduction of exotic trees and plants. Hitherto the neighbourhood of the port has been a barren and dreary desert of sand, and any efforts in this direction require a large amount of care and perseverance, so that success is all the more gratifying. An account of these experiments is given in the *Deutsches Kolonialblatt* (No. 9, 1901), by Herr Ortloff, by whom they were carried out. It was necessary to choose such plants, as both require but scanty sustenance, and are able to stand considerable changes of temperature and to resist the tendency to strong transpiration caused by the excessive dryness. Another adverse condition to be guarded against is the strong sea-wind which blows at Swakopmund, and as a protection against this Herr Ortloff planted a screen of wild tobacco, which flourished well, though presenting an interesting instance of adaptation to altered conditions. The leaves, which at a distance from the sea are broad and comparatively thin, became, in their new habitat, both narrower and thicker, thus approaching the typical form of leaves exposed to desert conditions. Among the trees planted were oaks, pines, juniper, eucalyptus, date-palms, vines, and figs, young plants being obtained from various quarters. Little success was attained with these, but on procuring seeds and sowing them Herr Ortloff was more successful, especially with the date-palm and Port Jackson acacia (*A. Cyanophylla*). European grasses did not thrive, but good results were obtained by sowing the ray grass of the Cape. Large areas of sand were also planted with grass and other plants specially suited for such ground, while the results from the cultivation of vegetables were most promising.

The Production of Kola-nuts in West Africa.—An interesting account of the present position of the kola-nut trade in West Africa, and of the distribution and varieties of the kola tree, is given by Count Zech in the first number of the *Mitteilungen aus den Deutschen Schutzgebieten* for the present year. The species which is of most importance from a commercial point of view grows chiefly in

the interior behind the Gold Coast, and is called "Goro n Gonsha," or kola of Gonsha, from the district which contained the former mart of Salaga. It has been lately described botanically as *Kola vera*. Great quantities of the nut are exported from the district above mentioned to the Hausa countries, the amounts passing through Kratyi, in Togoland, alone, reaching a total of almost 250 tons during the first six months of 1899. The writer points out the importance for Togoland of the establishment of kola plantations, towards which a beginning has been made already in the neighbourhood of Tapa. The trees thrive best in forest districts and in the vicinity of watercourses. The trees at Tapa belong likewise to the species *Kola vera*, and it is said that the original plantations were formed by the accidental sprouting of nuts brought from Ashanti. Cultivation by the natives there is, properly speaking, none, though self-sown seedlings are often transplanted to positions where they may have room to grow. After gathering, the outer rind of the fruit is stripped off, but the nuts are kept fresh in transit by being packed in leaves, which are kept moist. The transport is effected either on men's heads or on the backs of donkeys, mules, or horses. The species of kola most prized is one which grows in Nupe, and is called "laboshi," from a place in that country; but its characters need investigation. A kind which it has been attempted to introduce into Togo from the Cameroons is said to be known to the Hausas as "dankwatoffu," but its quality is inferior, and other kinds found in Adamaua and Yorubaland are of still lower value.

The Climate of Morocco.—In the sixth number for 1900 of the *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, Prof. Theobald Fischer gives the promised completion of his work on Morocco, recently published as an Erganzungsheft of *Petermann's Mitteilungen*, in a paper on the climatology of that country. The names of the fifteen sections into which the paper is divided afford, perhaps, the best summary of its contents: observations, outline and relief of the region, pressure and winds, the coast region of cold up-welling water, thermal relations, rainfall, the extension of the coastal region, rainfall in the interior, the mountain region, temperature in the interior, dust-winds, temperatures of wells and springs, malaria, Tangier and Mogador as health resorts. The observations at disposal are unfortunately very deficient, both as regards the number of stations and the length of time over which the observations extend, but by a careful study of the existing material in relation to general conditions, Prof. Fischer is able to throw a good deal of new light on the climatology of Morocco. The mountain wall of the Atlas cuts the country almost entirely off from the Sahara region, and its climate is chiefly controlled by the sub-tropical high-pressure belt of the eastern Atlantic. During winter it is actually within the high-pressure belt, and during summer somewhat south of it; hence the winter winds are west and south-west, especially towards the north, while in summer the north-east trade reigns supreme. In the examination of the low temperature and high humidity of the coastal strip, due to up-welling of water off the coast caused by the winds, Prof. Fischer is able to make considerable use of ship observations, and his discussion of this part of the subject is of peculiar interest. The distribution of rainfall in Morocco is illustrated by a map, which shows a coast belt with an annual fall of 400 to 600 millimetres, giving an agricultural region of great fertility. A narrow belt of steppe land (200 to 400 millimetres) lies between this and the Atlas region, in which the rainfall exceeds 800 millimetres, yielding an abundant supply of water for irrigation of the inner margin of the steppe.

Dr. Fischer's Latest Journey in Morocco.—Letters from Prof. Fischer, who has lately undertaken a third scientific journey in Morocco, are printed in the fourth number of *Petermanns Mitteilungen* for the present year. From Mogador

Dr. Fischer had made an excursion into the interior and back to the coast-line of Safi, passing through the three southern provinces of Shedma, Ahmar, and Abda. Each of these has a distinctive character, which seems to account for the sharp division which has always existed between them. Thus Shedma is a bush-covered region in which goats are reared. Ahmar is a treeless steppe affording pasture to cattle and sheep; while Abda is mainly a perfectly level plain with black earth well suited for agriculture. Lake Zyma, the only lake of any size in Morocco, was carefully examined. It is a typical steppe-lake, becoming in summer little more than a sheet of salt. The important geological discovery of fossils, proving the cretaceous age of the great tableland of South Morocco, was made. Dr. Fischer penetrated a long distance to the east, everywhere making valuable additions to the cartography of the country. He suffered much inconvenience from rain and cold. On a subsequent journey he struck the Um-er-Rbia near the imposing ruins of Bulanau, first visited by Lamprière a century ago. The position of its castle is likened to that of Marienburg on the Moselle, but it is on a larger scale. Following the stream down, Dr. Fischer passed through a region whose inhabitants had never seen a Christian in their midst, but who proved most friendly. He executed a complete survey of the lowest part of the river, which has here cut out a winding cañon-like valley in the tableland, thus exposing the water-bearing strata, whence many springs take their rise. The proposed examination of the Jebel Zerhun near Fez was abandoned owing to disturbances in the country, and Prof. Fischer broke up his caravan at Casablanca, intending to proceed *viâ* Rabat and Tangiers to Marseilles.

AMERICA.

The Centre of Population in the United States.—The *Census Bulletin* (No. 62) issued in connection with the twelfth census of the United States discusses the question of the centre of population in the United States and its movement during each decade since 1790. The centre of population is defined as the centre of gravity of the population, each individual in it being assumed to have the same weight. Its position was ascertained thus. The population was first distributed by "square degrees," being assumed to be located at the centre of each square, except where some manifestly disturbing influence was present, in which case the position was estimated. A position was then assigned, tentatively, to the general centre, and the shortest distances to the parallel of latitude passing through it from each subordinate centre ascertained. By multiplying each of these distances with the total population of the corresponding squares the "moments" of population north and south of the assumed parallel were obtained, the difference giving the required correction in latitude, while an analogous process gave the correction in longitude of the assumed centre. In this way the centre of population in 1900 was found to lie in 39° 9′ 36″ N., 85° 48′ 54″ W., a point near Columbus, in Southern Indiana. In 1790 the centre lay only a little west of 76°, and since that date it has moved steadily west with greater or less rapidity, with comparatively slight shiftings north or south in the successive decades. Some of the southerly shiftings are accounted for by the addition to the United States of new territory in that direction, *e.g.* Louisiana, Florida, and Texas; but other movements, one way or the other, are due to increased settlement in various parts of the States. The extreme variation in latitude has been less than 19′, the centre having, during its westerly shifting through over 9½°, closely clung to the 39th parallel. The smallest movement of all was that between 1890 and 1900. A position is also assigned for 1880, 1890, and 1900 to the "median point" of the population, *i.e.* the point of intersection of the lines dividing the population equally north and

south and east and west without regard to distance from the centre. In each case the median point lies some 70 to 100 miles from the centre of population, in a north-east to north-north-east direction.

Eskers and Esker Lakes in North-Eastern Indiana.—The moraine-landscape of North-Eastern Indiana, due to the joint action of the Erie and Saginaw lobes of the ancient northern ice-sheet, is marked by a variety of unusual features, which give to the scenery a strange and artificial aspect. Among these are certain esker-like ridges which form the subject of a communication by Mr. C. R. Dryer to the *Journal of Geology* (1901, No. 2). Some of the most remarkable of these lie on a line between the townships of Noble and Washington, and form an irregular parallelogram nearly enclosing the basin of High lake, a piece of water about half a square mile in area. The system of ridges around this lake presents a variety of diverse but strongly marked features, the explanation of which is a matter of difficulty. South of the lake is an east-to-west gravel ridge, presenting the characters of a glacial esker, but unusual in its height (over 80 feet in parts), the steepness of its slope, its short extent and isolation. It is pierced from top to bottom by a remarkable kettle-hole. On the north is a ridge of till, an esker in form, but with the material of a sub-marginal moraine. In the west it bends southward and passes abruptly into a gravel ridge, which with other north-to-south ridges, partly composed of sand, is sufficiently esker-like. Supposing the till ridge to have been a frontal moraine, the writer suggests that the ice behind it was traversed by tunnels or cracks which surrounded a block occupying the High lake basin, and into which the surface *débris* was irregularly dumped. In this case the large kettle above alluded to must mark the position of an isolated ice-block or island, which must have persisted during the entire period of filling. Genetic classification of the system as a whole seems, the writer says, impossible.

The Water-supply of the Great Salt Lake.—Reference was recently made in the *Journal* to the threatened drying up of the Great Salt lake, and proposed measures to avert such an occurrence. In the *Monthly Weather Review* for February last the question of the connection between the level of the lake and the rainfall of the surrounding region is discussed by Mr. S. F. Mackie, who gives a sketch-map showing the drainage basin of the lake; the visible water-supply, all derived from streams descending from the Wasatch or Uintah mountains; and an area of wet soil lying to the west of the lake. The area from which the visible supply is drawn is but a small portion of the whole basin, and this supply is apparently not sufficient to balance the effect of evaporation. But it is possible that some water may be derived from the wet area above alluded to, which slopes up from the lake and approaches the small Sevier lake, also higher than Great Salt lake, which is the lowest point of a considerable drainage basin. The present average depth of Great Salt lake is 13 feet, and within a period of fifty years it has been as low as now, but it has (in 1869) also been 13 feet higher, which means that the area was then much larger, and the volume probably more than double the present. Some have ascribed the fall in the level to the amount of water diverted for irrigation purposes, but Mr. Mackie shows that this cannot be the dominant influence, as, in spite of constantly increasing irrigation, the volume of the lake doubled itself between 1850 and 1880. He shows, on the other hand, the close parallelism which can be traced between the level of the lake and the rainfall curve for the district since 1850, and though any conclusion based on this might possibly be erroneous, the obvious inference may be considered highly probable. The fluctuations in the level of the lake have an important influence on the surrounding country through the reduction of the height of the underground water and the saline contents of the soil caused by a fall in the lake. The effect of these

changes on the vegetation can, in fact, be plainly traced. In drawing the rainfall curve for the last fifty years, Mr. Mackie discards as inadequate the method by which such curve is based on the total precipitation for each successive year. He adopts a somewhat complicated method with a view to obtaining a *continuous* rainfall record. For this purpose he takes the progressive aggregate of the rainfall, deducting from it, for each unit of time employed, the corresponding mean precipitation, so that the curve fluctuates about a horizontal line representing the normal precipitation. In this way periods in which the fall is zero or less than the mean are represented by downward portions of the curve, which may, of course, be expected to coincide with a downward tendency in the lake-level. The comparison drawn by the author between this method and the one discarded, is hardly a fair one, the former being based on the *monthly*, and the latter on the *annual*, record of rain.

The Rocky Mountains and the Sierra Nevada.—Two important additions have recently been made to the geomorphological literature of North America in a paper by Dr. Emil Deckert (*Zeitschrift der Gesellschaft für Erdkunde*) on "The High Ranges of the Rocky Mountains and the Sierra Nevada," and another by Henry Ward Turner (*Proc. Californian Academy of Sciences*) on "The Pleistocene Geology of the South Central Sierra Nevada, with Especial Reference to the Origin of the Yosemite Valley." Dr. Deckert's paper describes the significant features of the highest regions by carefully selected types, chosen specially (as regards the Rocky mountains) from the Sawatch mountains, and points out the enormous difficulty of distinguishing the work done by glacial streams from that done by glacier ice in the general modelling of the surface. Special prominence is given to the generally uniform level of the mountain peaks, and the marked contrast of this to the case of the Alps is pointed out. This fundamental difference is largely to be ascribed to difference of geological structure, although the different action of the erosive forces also plays an important part. Mr. Turner's paper deals with (1) the pre-pleistocene orogenic history of the Sierra Nevada; (2) orogenic movements in the pleistocene; (3) pleistocene periods, divided into the Sierran, the glacial, and the recent or post-glacial periods; and (4) the origin of the Yosemite valley. In accounting for the Yosemite valley, the author agrees with Becker and Branner in ascribing it to river-erosion, facilitated by strong jointing.

AUSTRALASIA AND OCEANIC ISLANDS.

British Solomon Islands Protectorate.—Mr. C. M. Woodford's Report on the British Solomon Islands for 1899–1900 (Colonial Reports, Annual, No. 320) records a satisfactory increase in the trade of the Protectorate during the year. The export of pearl shell of the gold-edged quality has nearly doubled in consequence of the systematic use of diving-gear. A considerable quantity of the shell commercially known as "green snail," used for making buttons and for ornamental purposes, has been exported during the year. Of imports, tobacco continues to hold the foremost place. A marked increase in the area of land under cultivation is reported. With a view to the suppression of head-hunting raids made by the natives of the New Georgia group and adjacent islands upon the natives of Choiseul and Ysabel, a new Government station has been established at Gizo, at the western end of the Protectorate. The site is described as elevated and healthy, centrally situated for observation, and possesses one of the best harbours in the Protectorate.

GENERAL.

Livingstone College.—The new premises of Livingstone College were formally opened on May 23 by Mrs. Bruce, Dr. Livingstone's eldest daughter, a

statement as to the history and work of the college having been previously made by the principal, Dr. Harford-Battersby. The scope and aims of the college as a means of supplying a training in hygiene to missionaries about to proceed to the tropics have already been explained in the *Journal*. The beneficial results of such training have been fully proved in many instances, and, as a result of the increasing number of students availing themselves of the facilities offered, it has been necessary, since the founding of the college in 1894, to twice move to larger quarters. The present site is at Knotts Green, Leyton, where a fine old house and grounds, the residence of the late Mr. J. Gurney Barclay, were last year secured for the purpose. Contributions towards the expense of the purchase have been received to the amount of £4600, but it was stated that £3600 was still required, which, it is hoped, may be forthcoming before long, the college being regarded as a fitting memorial to Dr. Livingstone. The Royal Geographical Society was represented at the opening ceremony by Sir George Goldie.

Hawkins's Maiden Land: Errata.—The following corrections should be made in Commander Chambers' communication, printed in the April number of the *Journal*: On p. 421, line 30, *Serius* should be *Sirius*; on p. 422, line 14, the name should be Anson; line 17, for *west* coast, *north* should be read; and in lines 15 and 16 from the bottom, the bearings should be N. by E. and E. by N.

OBITUARY.

Dr. Emil Bretschneider.

Dr. Emil Bretschneider, one of the best-known authorities on Chinese geographical and antiquarian questions, died early in May at St. Petersburg, at the age of sixty-eight. The deceased scholar went out to China during the sixties as physician to the Russian Embassy at Peking, and resided there in all no less than eighteen years. He soon became known for his contributions, in *Petermanns Mitteilungen* and elsewhere, on geographical and historical questions, one of his earliest being a detailed description of the districts around Peking, then little known to Europeans generally. He was a good Chinese scholar, and in subsequent works, as, *e.g.*, in his 'Mediæval Researches from Eastern Asiatic Sources,' published in 1888 in Trübner's Oriental Series, he gave a valuable insight into the geographical knowledge possessed by the Chinese during the middle ages. Another of his works, entitled 'Fusang,' dealt with the supposed discovery of America by the Chinese, which he refused to accept as a historical fact; while in his 'History of European botanical discoveries in China,' published in 1898, he rescued from oblivion much of the early work by European travellers in this direction. His latest geographical contribution was a map and description of the Manchurian territory leased by China to Russia, published in the *Izvestia* of the Russian Geographical Society.

Lord Wantage.

We regret to record the death of the distinguished soldier, Lord Wantage, who died early in June, after a long illness, at his house, Lockinge Park, Wantage. Robert James Lindsay, Baron Wantage, was born in 1832, being the second son of Lieut.-General Lindsay, of Balcarres. He was educated at Eton, afterwards entering the army and serving with distinction in the Crimean War. For his gallant

conduct at Alma and Inkermann he gained the then newly instituted Victoria Cross. He was perhaps best known for his zealous support of the volunteer movement, to which, after leaving the army, he devoted himself with great energy, becoming first Lieut.-Colonel of the Berkshire volunteers, and subsequently commanding the Hon. Artillery Company of London. He also did excellent work in connection with the administration of charitable funds for the relief of sufferers by war. Lord Wantage was an extensive landowner, and gave much attention to farming, doing much to encourage the adoption of improved methods among his tenants and others. He joined the Society in 1867.

E. W. Parsoné.

Mr. E. W. Parsoné, whose death at the comparatively early age of fifty-two has lately been announced, was well known for his excellent work in connection with submarine telegraphy. Educated at University College School, Mr. Parsoné served for a time on the staff of the Great Western Railway, until his services were secured by the late Sir Charles Bright for the telegraph undertakings with which his name is associated. This, as it turned out, determined the rest of his career, which was devoted to work in connection with cable-laying in various parts of the world, especially the West Indies, South America, and West Africa. For the value of his services he had received decorations from both the French and Portuguese governments.

Obituary of the Year.

The following is a list of the Fellows who have died during the year 1900–1901 (April 30):—

J. S. Ancona; H. S. Ashbee; Dr. John Anderson; Arthur Austin; George Allan; Donald Andrew; Ralph Appleton; Wm. Brown; Sir W. Brooks; John Baird; Sir James Bain; John Butler; Joshua Peter Bell; G. T. Baron; James Buckle; Hon. John Baker; J. W. Bolton; Dr. J. C. Burnett; Dr. R. D. Buchanan; Major George Buckle; Edward Case; T. A. Cook; J. G. Cockin; Ernesto de Canto; J. F. Cornish; A. J. Currie; Hon. D. Carnegie; L. Cordeiro; Lieut. J. R. Craigen; Prof. Paul Chaix; Rev. James Chalmers; Sir W. Crossman; Thomas Devas; Lord Hamilton of Dalzell; J. H. De Ricci; Sir J. R. Dickson; Dr. G. M. Dawson; Captain P. R. Denny; Richard Eve; Viscount Encombe; Wm. Herbert Evans; C. Gordon Frazer; Sir M. Frazer; Dr. A. Fyfe; Sir R. Goldsworthy; A. J. Grant; Major J. Macpherson Grant; Peter Goiffon; H. M. Gordon; Abraham Gould; F. A. Gwynne; General M. Hunter; Commander G. Huntingford; Harry Harvey; Theodore Harris; Douglas Hall; L. H. L. Huddart; Lord Inverclyde; N. A. Jephson; G. Lawson Johnson; Joseph Johnson; George Kelly; James Kendal; E. H. King; L. W. King; Sir Edward Knox; J. H. Leech; J. P. Leslie; Louis Letord; Lord Loch; Edwin Ludlow; J. R. Lush; Wm. Maclean; Sir J. W. Maclure; Sir Thomas McIlwraith; P. H. McKerlie; Thos. Marwood; Rev. A. Marshall; Sir G. S. Measom; Sir R. Murdoch-Smith; Noblet Phillips; Major Serpa Pinto; General Pitt-Rivers; F. W. Preston; J. S. Price; E. A. Prinsep; R. Proctor-Sims; Fredk. Pullar; J. B. Redman; Rev. H. Richards; J. T. Rogers; Captain Ernest Rose; Alex. Ross; C. J. A. Rumbold; Robert Ryrie; The Duke of Saxe-Coburg-Gotha; General G. H. Saxton; Dr. H. Schlichter;

Captain D. G. Seagrim; Major-General E. C. Sim; Henry G. Simon; James Shoolbred; Edwd. Smith; S. Clement Southam; Hinton Spalding; Lieut.-Colonel Ross Thomson; Hon. F. C. Vereker; E. G. Verschoyle; S. Kingston Vickery; Admiral the Hon. W. J. Ward; Lieut. Watts-Johns; Sir G. H. Willis; R. B. Woodd; Matthew Woodifield.

CORRESPONDENCE.

The Egyptian Emerald Mines.

Hermon, 31, Lingfield Road, Wimbledon.

In the paper lately published (*Geographical Journal*, vol. xvi. p. 357) on the Egyptian emerald mines, the author, Mr. D. A. MacAlister, owing to lack of space, was obliged to confine himself strictly to what he himself had seen and noted, and therefore to omit mention of my own expedition to these mines in 1897–98, of M. Floyer's in 1891, and of Caillaud's two expeditions at the beginning of the century.

In both Floyer's and Caillaud's publications in French, the temples are illustrated and described.

For the same reason, Mr. MacAlister could give no account of the mines on the other or Zabara side of the mountains, which were visited by Mr. Forster, who was in command, and which I considered the most interesting and most promising.

The result of my expedition, which was made alone with a small caravan of natives, was the *raison d'être* of that in which Mr. MacAlister took part.

I think the old Roman wells might advantageously be opened up by the Egyptian Government, especially on the route from Edfu, which was the one taken by Caillaud on his second expedition. I found the Egyptians made splendid labourers and intrepid miners. I searched them in the middle of the desert on my way back, but found no gems, as Caillaud did, concealed upon the persons of his Albanians.

Yet the day after I quitted Aswan, as I was informed by some tourists, emeralds were offered for sale in the bazaar. A few of them were subsequently confiscated and forwarded to me by the civil governor, Ali Haidar.

H. W. Seton-Karr.

Drying up of the Great Salt Lake.

23, Alleyn Terrace, West Dulwich.

In the May number of the *Geographical Journal*, I see at p. 533 a note headed as above, in which, quoting from *Science*, the paragraph runs that Mr. Marcus E. Jones has proposed to prevent the possible extinction of the lake by bringing an additional water-supply into the Great Salt Lake basin by canal from the Snake river of Idaho.

Without entering into the question of whether the lake really is drying up, or is only on one of its downward marches, may I say that a suggestion to bring an added supply of water into the basin from the Snake river was made ten years ago by a Fellow of your Society, viz. the present writer, and will be found in the columns of the *Salt Lake Tribune* of the day.

I would add that the Great Salt Lake oasis and adjacent region presents—and I speak as a life-long wanderer and sojourner in many lands—some fascinating studies in the glories and mysteries of Nature, to which may be added, perhaps, the arts of man.

Frederick Trimmer.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1900-1901.

Anniversary Meeting, May 20, 1901.—Sir CLEMENTS MARKHAM, K.C.B., F.R.S., President, in the Chair.

THE Secretary read the minutes of the last Anniversary Meeting.

ELECTIONS.—*Captain R. L. Adberrcon (Cameron Highlanders); Samuel Aitken; Major Norman Cuthbertson (Black Watch); James A. Dengham; Somerville Helsham; Colonel Malcolm John Meade, C.I.E.; Elmer Bradner White, D.D.S.*

The presentation of the awards for the year then took place.

The PRESIDENT, addressing Dr. Donaldson Smith, said: The Council of the Royal Geographical Society had no hesitation in awarding you one of the Royal Medals, on account of your now memorable journeys on two occasions across unknown parts of Africa. Your first journey was undertaken, as every one knows, under very great difficulties indeed; then you found your way to the northern side of Lake Rudolf, and explored the lower course of the Omo, and returned by the east side of the lake and by a previously unknown route. That was a very important journey indeed. But, in my opinion, it is almost eclipsed by your second journey, although perhaps not more difficult, still far more striking and important, when you made your way from the coast to the upper Nile over an entirely unknown country. In my first address to this Society I mentioned three great blocks on the continent of Africa which were entirely unknown, and that which you have traversed and discovered is one of them, therefore, personally, I must offer you my very warmest congratulations. But the great utility of your journey is this: you have not, like an ordinary explorer, made a common route survey, but you have made a scientific survey, a triangulation frequently checked by astronomical observations with theodolite and chronometer, and it is that admirable work which you have done under considerable difficulties which has influenced the Council in deciding that you have well deserved the medal which is now awarded to you. Mr. Choate, his Excellency the American Ambassador, had promised to receive your medal, but the Council has been much gratified that you should have considered it yourself of such importance that you should have made a journey from the United States on purpose to receive it. I have much pleasure in placing the medal in your hands, and I may mention that this will be the last time the effigy of our late sovereign Queen Victoria will appear on the Patron's Medal.

Dr. DONALDSON SMITH, in acknowledging the honour, said: Sir Clements Markham and Fellows of the Royal Geographical Society, I wish to thank you exceedingly for this, and to express my appreciation of the very high honour the Geographical Society has conferred upon me. After labours and hardships, it is a great pleasure and satisfaction that such a very great authority as the Royal Geographical Society should confer this distinction upon me. As Sir Clements Markham has said, it will appeal to me very much, as I know it will to many people in the United States, to know that this will be the last time the face of Queen Victoria will appear on the medal. It is a special gratification to me that I have received this from the hands of so distinguished an explorer and geographer as Sir Clements Markham.

The PRESIDENT, addressing the Italian Ambassador, Signior Pansa, said: Your Excellency Signor Pansa, we have been informed by the Duke of the Abruzzi that you will be good enough to receive the medal for His Royal Highness. The Duke of the Abruzzi has undertaken two very important geographical explorations

at his own expense. His journey to the summit of Mount St. Elias was undertaken entirely, I believe, at his Royal Highness's own expense, and was of very great geographical importance. This enterprise of the Duke takes a very remarkable position. The attainment of our award, on the one hand for ascending Chimborazo by our gold medallist Whymper, and on the other hand the crossing of the glacier of Greenland by our gold medallist Nansen, stand as it were one on each side of this undertaking of the Duke, for in ascending mountains in a lower latitude there is only 4000 or 5000 feet of snow and ice to cross, whereas in ascending this famous mountain in a very high latitude the Duke had at least 14,000 feet to cross of snow and ice, which entailed upon him journeys and nights of weeks' duration upon the snow; and from that point of view I compare his work with that of Nansen in crossing Greenland: it stands between the two achievements. In my opinion that alone secured for the Duke a claim for one of our royal awards. But when we come to his arctic expedition, I think it will be allowed on all hands that those merits not only fill the cup, but overflow it. I had the honour of an interview with the Duke at Christiania, and I was then very much struck by his minute knowledge of all the details of the expedition. For close attention to details is the secret of polar success. In the *Stella Polare* he forced his way up that archipelago of Franz Josef Land, and attained a position which no ship had ever reached before. There he was in great peril and danger; his ship was driven on shore and was stove in, and he showed great powers of organization in bringing his men through the winter, repairing his ship and bringing it home again, and in organizing his sleigh expeditions to the north. I trust, Signor Pansa, that, in forwarding this token of respect of the Geographical Society for the work of His Royal Highness the Duke, you will convey to him the high appreciation of our Council for his labours.

Your Excellency, perhaps it will be convenient if I also request you to take charge of the award for Captain Cagni, who was the companion of His Royal Highness in his ascent of Mount St. Elias, and his very faithful and very excellent lieutenant during his arctic expedition. The great merit of Signor Cagni's remarkable journey was not so much the distance he went over as the fact that he had no depôt to rely upon, and nothing to be obtained from the country in the shape of food; he had to rely entirely upon his own provisions that he took with him. We therefore considered that Signor Cagni, having attained the highest latitude ever reached by man—86° 33′ N.—had won our commendation, and the Council therefore designated for him the Gill award. I have to request that you will transmit it in the form in which Signor Cagni has desired, which is, I believe, a silver tea-tray, and the diploma will go with it.

The Murchison Award has, as you are aware, been given to our old Map Curator and Instructor to the Society, Mr. Coles. I know that all his pupils, and I am sure that every one acquainted with him connected with this Society, will be delighted that he has had this award adjudged to him by the Council. I feel that we overworked him, and that he was obliged to retire on account of having been overworked by us, and I am very glad to be able to announce that since his retirement his health has improved.

Mr. Bernacchi and Sub-Lieut. Colbeck, the other two awards have been adjudged to you for your excellent work during your very severe service with Mr. Borchgrevink's expedition. Mr. Bernacchi made a series of very valuable meteorological and magnetic observations; but not only that, he has used his eyes to very good purpose, and has given us a great deal of valuable and interesting geographical information, including the paper he read to us last March, and it must have been a matter of gratification to him to have Sir Joseph Hooker and Mr. Blanford present,

who were both extremely interested in his paper, and who told me afterwards that it had set them thinking. Sub-Lieut. Colbeck has also done extremely valuable work, and has also been an excellent observer, not only in making astronomical and magnetic observations and in the drawing of charts, but also in using his eyes to very good effect, and being able to report many interesting points connected with the coast of Victoria Land. I have great pleasure in presenting the awards to Mr. Bernacchi in the form which he wished it to take, with the diploma, and to Sub-Lieut. Colbeck in the form he wished it to take, also with the diploma.

The President then delivered his Anniversary Address (see p. 1).

Visitors then withdrew, and, the President having appointed Mr. Wm. Corner and Mr. Fagan to be scrutineers, the election of the Council for the ensuing year was proceeded with. The honorary secretary, Major Darwin, read the report of the Council for 1900; this will be published in the Year-book for 1902.

The President then announced that the Council, as proposed, had been duly elected. The list is as follows, the names of new members, or those who change office, being printed in *italics*:—

President: Sir Clements Markham, K.C.B., F.R.S., F.S.A. *Vice-Presidents*: Right Hon. Sir George D. Taubman Goldie, K.C.M.G.; Colonel Sir Thomas Hungerford Holdich, R.E., K.C.I.E., C.B.; Admiral Sir Anthony H. Hoskins, G.C.B.; Admiral Sir F. Leopold McClintock, K.C.B., D.C.L., F.R.S.; *George S. Mackenzie*, C.B.; General Sir Charles W. Wilson, R.E., K.C.B., K.C.M.G. *Treasurer*: Edward L. Somers Cocks. *Trustees*: Right Hon. Lord Avebury, F.R.S.; Sir Cuthbert E. Peek, Bart., F.R.A.S., F.S.A. *Honorary Secretaries*: Major Leonard Darwin, R.E.; James F. Hughes. *Foreign Secretary*: Sir John Kirk, K.C.B., G.C.M.G., F.R.S. *Councillors*: Major-General Sir John C. Ardagh, K.C.I.E., C.B.; *Lord Belhaven and Stenton*; *Prof. T. G. Bonney*, LL.D., F.R.S.; Sir H. E. G. Bulwer, G.C.M.G.; *Colonel J. Cecil Dalton*, R.A.; Clinton T. Dent; Major-General Sir Francis W. De Winton, R.A., G.C.M.G., C.B.; Admiral Sir R. Vesey Hamilton, G.C.B.; Colonel D. A. Johnston, R.E.; Colonel Augustus Le Messurier, R.E., C.I.E.; L. W. Longstaff; Admiral A. H. Markham; *General Sir Henry W. Norman*, G.C.B., G.C.M.G., C.I.E.; Sir George S. Robertson, K.C.S.I.; Howard Saunders, F.L.S.; General Sir Henry A. Smyth, K.C.M.G.; Herbert Warington Smyth; *H. Yates Thompson*; *Admiral Sir Richard E. Tracey*, K.C.B.; *Colonel J. K. Trotter*, C.M.G., R.A.; Colonel Charles Moore Watson, R.E., C.M.G.

Twelfth Ordinary Meeting, June 10, 1901.—Sir Clements Markham, K.C.B., President, in the Chair.

Elections.—*R. B. Boyd-Carpenter*; *Bertram M. Chambers, Commander R.N.*; *Captain Thomas Ashley Cubitt, R.A.*; *A. G. Hipwell-Howitt*; *Captain D. C. Macdonald, Scottish Rifles*; *Henry Reeve, C.M.G.*; *Captain Edward Wilkinson, R.N.*; *W. Wybergh*.

The Paper read was:—

"Travels in Search of Waves in 1900." By Vaughan Cornish.

THE ANNUAL DINNER.

In the evening, the President, Sir Clements Markham, presided over the anniversary dinner, which took place at the Whitehall Rooms of the Hôtel Métropole. Among those present (250 in all) were the Duke of Northumberland, Lord Mansfield, the Lord Chief Justice of England, Lord Camperdown, General Sir Henry

Norman, Colonel Sir James Wilcocks, Admiral A. L. Douglas, Lord Belhaven and Stenton, Lord Eustace Cecil, Admiral Sir G. Noel, General Sir F. D. Lugard, Earl of Lathom, Admiral Markham, the Greek Minister, Dr. Moreno, Sir William Petersen, Dr. A. Donaldson Smith, Sir H. E. G. Bulwer, the Hon. G. C. Brodrick, Captain R. F. Scott, Sir William Abney, Mr. J. J. H. Teall, General Sir C. W. Wilson, General Sir H. Smyth, Sir Francis Mowatt, Sir George Robertson, Sir G. T. Goldie, Sir H. Howorth, Sir A. Hodgson, Prof. Ray Lankester, Mr. A. B. Kempe (Treasurer of the Royal Society), Major L. Darwin, and Mr. J. F. Hughes.

The PRESIDENT, after giving the loyal toasts, proposed "The Navy and Army," to which Admiral ARCHIBALD DOUGLAS and Colonel Sir JAMES WILLCOCKS responded.

The PRESIDENT next proposed the health of "the Medallists," which was acknowledged by Dr. A. DONALDSON SMITH.

The PRESIDENT proposed "The Royal Society," to which Mr. A. B. KEMPE, the Treasurer of the Royal Society, responded.

The PRESIDENT proposed "Success to the Antarctic Ship *Discovery*," which was responded to by Captain ROBERT SCOTT, R.N.

Sir GEORGE GOLDIE proposed "The Guests," to which the LORD CHIEF JUSTICE responded; and the toast of "The President and the Society" was subsequently proposed by the LORD CHIEF JUSTICE and acknowledged by the PRESIDENT.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce.
C. Rd. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
k. u. k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. = Memoirs, Mémoires.
Met. = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Alphabets. *Petermanns M.* 47 (1901): 56–57. **Henkel.**

Die Verbreitung der Schriftarten in Europa. Von Dr. L. Henkel. *With Map.*

On the distribution in Europe of the Latin, German, Cyrillic, Greek, and other alphabets.

Danube. *Petermanns M.* **47** (1901): 57–59. **Sieger.**

Zur Thalgeschichte des obersten Donaugebietes. Von Prof. Dr. R. Sieger.

Dardanelles, etc.

Sailing Directions for Dardanelles, Sea of Marmara, Bosporus, and Black Sea. Fifth edition, 1900. London: J. D. Potter, 1900. Size 9½ × 6, pp. xxvi. and 362. *Index Charts. Price* 3*s.* 6*d. Presented by the Hydrographer, Admiralty.*

Denmark. *B.S.G. Lille* **35** (1901): 290–303. **Oesterby.**

Le Danemark. Par M. Pierre Oesterby.

Denmark.

Den Danske Turistforenings Aarsskrift, 1901. København: G. E. C. Gad, 1901. Size 9½ × 6, pp. 158. *Illustrations. Presented by the Danish Tourist Club.*

A general account of the natural scenery and objects of interest to tourists in Denmark.

Denmark—Magnetism. **Paulsen.**

Institut météorologique de Danemark. Annales de l'observatoire magnétique de Copenhague. Publiées par Adam Paulsen. Années 1895–96. Copenhague: G. E. C. Gad, 1900. Size 13 × 8, pp. 50. *Presented by the Institute.*

Hungary. *Földrajzi Közlemények* **27** (1899): 261–266. **Hanusz.**

Magyarország határai. Hanusz Istvántól.

On the boundaries of Hungary.

Hungary. *Abrégé B.S. Hongroise G.* **27** (1899): 19–24. **Havass.**

Die Slovakisierung des Ungarischen Oberlandes. Von Dr. Rudolf Havass. [From *Földrajzi Közlemények*: **27** (1899): 56–62.]

Gives the results of a study by Dr. von Korösi on the increase of the Slovak element at the expense of the Magyar in the Hungarian uplands.

Hungary. *Abrégé B.S. Hongroise G.* **27** (1899): 32–37. **Szántó.**

Die Geschichte der Stromregulierung im Oberen Csallóköz. Von Dr. Karl Szántó. [From *Földrajzi Közlemények*: **27** (1899): 138–150.]

Csalloköz is the Hungarian name for the great Schütt island of the Germans, north of the Danube, where it first enters Hungary.

Hungary—Carpathians. **Martonne.**

Le levé topographique des Cirques de Gauri et Galcescu (Massif du Paringu). Par E. de Martonne. Bucuresci, 1900. Size 9½ × 6½, pp. 42. *Maps. Presented by the Author.*

On the writer's detailed survey of two typical cirques in the Carpathians, with a view to elucidating their mode of formation.

Hungary—Carpathians. **Martonne.**

Recherches sur la période glaciaire dans les Karpates méridionales. Par E. de Martonne. (*Bulletin de la Société des Sciences de Bucarest—Roumanie*, An. ix. No. 4.) Bucarest, 1900. Size 11½ × 8, pp. 60. *Maps and Illustrations. Presented by the Author.*

Hungary—Historical. *Földrajzi Közlemények* **27** (1899): 169–174. **Téglás.**

A Rómaiak első hadi útja az Alduna jobb partján Dacia ellenében. Téglás Gábortól.

On the route along the right bank of the lower Danube followed by the Romans in their first Dacian campaign.

Hungary—Historical. *Földrajzi Közlemények* **27** (1899): 320–324. **Téglás.**

A Marosra és a Tiszára vonatkozó legrégibb földrajzi adatok. Téglás Gábor.

On the oldest geographical data respecting the Maros and the Tisza.

Hungary—Industries. *Földrajzi Közlemények* **27** (1899): 129–138. **Hanusz.**

Az iparüzés földrajzi elosztakozása Magyarországon. Hanusz Islvántól.

On the geographical distribution of industries in Hungary.

Hungary—Karas River. *Abrégé B.S. Hongroise G.* **27** (1899): 28–30. **Téglás.**

Die ältesten Namensvariationen des Flusses Karas. Von Gabriel Téglás. [From *Földrajzi Közlemények* **27** (1899): 78–80.]

The writer derives the Arcidava of the Peutinger Table from Arcas, probably a variant of the name Karas, and dava = "burg."

Hungary—Settlement. *Abrégé B.S. Hongroise G.* **27** (1899): 57–64. **Hanusz.**
Die Erstarkung unserer Nation im Alföld. Von Stefan Hanusz. [From *Földrajzi Közlemények*: **27** (1899): 217–226.]

On the progress of settlement in the Hungarian lowland.

Hungary—Towns. *Abrégé B.S. Hongroise G.* **27** (1899): 24–28. **Bartek.**
Die ungarischen Städte als Centren der nationalen Bildung. Von Ludwig Bartek. [From *Földrajzi Közlemények*: **27** (1899): 81–88.]

Iceland. *J. Manchester G.S.* **16** (1900): 149–177. **Newby.**
Iceland and the Icelanders. By John R. Newby. *With Illustrations.*

Continuation of a series of lectures delivered at the Manchester Geographical Society (cf. *Journal*, vol. xvii. p. 318).

Iceland and Faroe. *G. Tidskrift* **16** (1901): 30–34. **Hammer.**
Søopmaalinger under Island og Færøerne. Af Kaptajn R. Hammer.

Italy—Bibliography. **Magistris.**
Bibliografia Geografica della regione Italiana. Saggio per l'anno 1899 di L. F. de Magistris. Roma, 1901. Size 9¼ × 6, pp. xii. and 150.

A useful compilation giving the titles and an indication of the contents of publications relating to Italy and neighbouring districts, whether books or articles in periodicals. It includes foreign as well as Italian works.

Italy—Brindisi. *B.S.G. Italiana* **2** (1901): 294–328. **De Giorgi.**
Il porto di Brindisi. Note di geografia fisica del dott. Cosimo De Giorgi.

The writer traces the natural causes which have led to the rise of Brindisi.

Italy—Geographical terms. *Riv. G. Italiana* **8** (1901): 89–101, 162–172. **Marinelli.**
Termini geografici dialettali raccolti in Cadore. Per Olinto Marinelli.

Italy—Place-names. *B.S.G. Italiana* **2** (1901): 280–294. **Grasso.**
Sulla frequenza e sulla distribuzione geografica dei Comuni attuali d'Italia con nome derivato dalla configurazione verticale del terreno (1ª serie). Nota del Prof. Gabriele Grasso.

Italy—Trade. **Neville-Rolfe.**
Trade of Southern Italy for the year 1900. Foreign Office, Annual No. 4550, 1901. Size 10 × 6½, pp. 22. *Price* 1½*d.*

It is thought that American coal may prove a serious competitor of British coal in South Italy. A great development of Italian trade (in German vessels) with East Africa is noted, but it is anticipated that Jamaica will prove a formidable rival as regards the fruit trade with the United Kingdom.

Italy—Venetia. *B.S.G. Italiana* **2** (1901): 328–336. **Stegagno.**
Alcuni cenni sui Laghi Euganei ed in particolare sul Lago d'Arquà-Petrarca. Nota preliminare del socio dott. Giuseppe Stegagno. *With Sketch-map.*

Gives the results of soundings, observations of temperature, etc.

Italy—Vesuvius. *Riv. G. Italiana* **8** (1901): 152–161. **Fiechter.**
Notizie sul nuovo rilevamento del Vesuvio eseguito nell' anno 1900 di Alfredo Fiechter. *With Illustrations.*

Mediterranean—Cyprus. *G.Z.* **7** (1901): 159–161. **Maas.**
Der Salzsee von Larnaca auf Cypern. Von Dr. Otto Maas.

An account of the investigations undertaken, at the instance of the writer, by Mr. C. V. Bellamy (cf. *Journal*, vol. xvii. p. 189).

North-sea coasts. *Verh. Ges. Erdk. Berlin* **28** (1901): 172–175. **Kretschmer.**
Herr Dr. K. Kretschmer: Die physische Entwickelung der Nordsee-Küste in historischer Zeit.

Abstract of a paper on the changes to which the North sea coasts have been subject.

Pyrenees. *J. Geology* **9** (1901): 28–46. **Adams.**
The Excursion to the Pyrenees in connection with the Eighth International Geological Congress. By F. D. Adams. *With Illustrations.*

The excursion was organized principally for the study, in the Pyrenees, of transformation of sedimentary rocks by intrusive mass.

Rhine. *G.Z.* **7** (1901): 140–148. **Huene.**

Eine orographische Studie am Knie des Rheines. Von F. v. Huene. *With Map.*

Rumania. **Martonne.**

La Roumanie. Géographie physique, Géologie, Climat, Biogéographie, Géographie économique, Géographie politique. Par E. de Martonne. (Extrait de la Grande Encyclopédie, T. xxvii.) Paris: Société Anonyme de la Grande Encyclopédie, 1900. Size 7½ × 4½, pp. 72. *Presented by the Author.*

An excellent outline of the Physical Geography of Rumania, with sections on its Ethnology, Industries, Political Geography, etc.

Russia. *B. Comité Géolog. St. Pétersbourg* **19** (1900): 201–289. **Nikitin.**

La vallée de la Soura aux environs de la ville de Penza, ses modifications séculaires et récentes, par S. Nikitin. [In Russian, with *résumé* in French.] *With Maps.*

Russia—Kalendar. *Deutsche Rundschau G.* **23** (1900): 241–252. **Hegner-Rezelfeld.**

Die Reform des Kalenders in Russland. Von Dr. J. v. Hegner-Rezelfeld.

Russia—Kursk. *B. Comité Géolog. St. Pétersbourg* **19** (1900): 1–26. **Nikitin.**

S. Nikitin. Deux sondages profonds et les anomalies du magnétisme terrestre dans le gouv. de Koursk. [In Russian, with *résumé* in French.]

Russia—Novaya Zemlya. *Abrégé B.S. Hongroise G.* **27** (1899): 55–57. **Teleki.**

Histoire de la découverte de la Nouvelle-Zemble par le Comte Paul Teleki. [From *Földrajzi Közlemények* **27** (1899): 195–205.]

Russian Empire. *La G., B.S.G. Paris* **3** (1901): 133–138. **Barré.**

L'Atlas climatologique de l'Empire de Russie. Par L. Barré.

A description of the lately-issued Climatological Atlas of the Russian Empire.

Servia. **Macdonald.**

Trade of Servia for the years 1899 and 1900. Foreign Office, Annual No. 2553, 1901. Size 10 × 6½, pp. 20. *Price* 1½*d.*

Contains details of recent attempts at gold-mining, regarding which the writer says, "A sober hope that gold may be worked in Servia in paying quantities is all that experience would seem so far to justify."

Spain—Ancient geography. **Blázquez.**

B.S.G. Madrid **42** (1900) (Separate Memoir, 72 pp.).

Descripcion de Iberia, por Estrabón, traducida por Antonio Blázquez.

United Kingdom—Cornwall. *P.S. Antiquaries* **18** (1900): 117–123. **Haverfield.**

On an inscribed Roman ingot of Cornish tin and Roman tin-mining in Cornwall. By F. Haverfield. *With Plate.*

United Kingdom—Ireland. **Ward.**

Thorough Guide Series. Ireland (Part II.) East, West, and South, including Dublin and Howth. By C. S. Ward, M.A. Fourth Edition. London: Dulau & Co., 1901. Size 6½ × 4½, pp. xxiv. and 236. *Maps and Plans. Price 5s. net. Presented by the Publishers.*

A few additions have been made since the third edition, published in 1895.

United Kingdom—Rainfall. *Quarterly J.R. Meteorolog. S.* **27** (1901): 79–97. **Mellish.**

The seasonal rainfall of the British Isles. By Henry Mellish. *With Map and Diagrams.*

The writer gives both the monthly and seasonal percentages of total rainfall for some two hundred stations in the British Isles.

United Kingdom—Scotland. **Baddeley.**

Thorough Guide Series. The Northern Highlands (Scotland, Part ii.) containing a full description of Aberdeen, Inverness, Loch Maree, and Gairloch, and of the mainland north of those places in the Counties of Aberdeen, Banff, Elgin and Nairn, Inverness, Ross and Cromarty, Sutherland and Caithness. By M. J. B. Baddeley, B.A. Sixth edition. London: Dulau & Co., 1901. Size 6½ × 5, pp. xvi. and 150. *Maps and Plans. Price 3s. 6d. net. Presented by the Publishers.*

The additions to this well-known guide, as compared with the fifth edition (1894), are chiefly in points of detail.

United Kingdom—Scotland. **Murray and Pullar.**

A Bathymetrical Survey of the Fresh-water Lochs of Scotland. By Sir John Murray, K.C.B., etc., and the late Fred. P. Pullar.—Obituary—Frederick Pattison

Pullar. By James Chumley. (From the *Geographical Journal* for March, 1901.) Size 10 × 6½, pp. 26. *Maps and Illustrations.*

United Kingdom—Scotland. **Murray and Pullar.**
Scottish G. Mag. **17** (1901): 113–128, 169–175.

A Bathymetrical Survey of the Fresh-water Lochs of Scotland. Parts ii. and iii. By Sir John Murray, K.C.B., etc., and the late F. P. Pullar. *With Maps and Illustrations.*

This paper is identical with that published in the *Journal* for March last.

United Kingdom—Scotland—Spey. *Scottish G. Mag.* **17** (1901): 185–193. **Hinxman.**

The River Spey. By Lionel W. Hinxman, B.A. *With Maps.*

On points of interest presented by the physiography and geological history of the Spey.

United Kingdom—Thirlmere. *J. Manchester G.S.* **16** (1900): 225–226. **Oldham.**

Beach Formation in the Thirlmere Reservoir. By R. D. Oldham. *Illus.*

Abstract of a paper read at the Bradford meeting of the British Association, in which Mr. Oldham describes the beach-formation which has taken place in Thirlmere since its conversion into the Manchester reservoir.

ASIA.

Central Asia. **Futterer.**

Die Allgemeinen Wissenschaftlichen Ergebnisse einer Forschungsreise durch Central-Asien. Nordost-Tibet und Inner-China. Vortrag gehalten auf dem VII. Internationalen Geographen-Kongress in Berlin im Jahr 1899. Von Prof. Dr. K. Futterer. (Sonderabdruck aus den Verhandlungen des VII. Internationalen Geographen-Kongresses in Berlin, 1899.) Berlin, 1900. Size 10 × 6½, pp. 781–807.

Central Asia. *Verh. Ges. Erdk. Berlin* **28** (1901): 77–86. **Hedin.**

Reiseberichte von Dr. Sven Hedin aus Central-Asien. (Aus Briefen an Herrn v. Richthofen.)

In these letters Dr. Hedin gives some additional details respecting his recent journeys, described in the February number of the *Journal* (vol. xvii. p. 181).

Central Asia. *Deutsch. Rundschau G.* **23** (1901): 311–316. **Kozlov.**

Die Reise Kozlov's in Central-Asien. *With Map.*

Translation of the notice by M. Deniker in *La Géographie.* Cf. *Journal*, vol. xvii. p. 303.

Ceylon. **Leclercq.**

Les Ruines d'Anouradhapoura (Ceylon). Communication faite au VII^ème^ Congrès International de Géographie à Berlin en 1899. Par M. Jules Leclercq. (Sonderabdruck aus den Verhandlungen des VII. Internationalen Geographen-Kongresses in Berlin, 1899.) Berlin, 1900. Size 10 × 7, pp. 598–606. *Presented by the Author.*

Ceylon. *Deutsche Rundschau G.* **23** (1901): 263–268. ——

Die Insel Ceylon. *With Map and Illustrations.*

China. *Tijds. K. Ned. Aard. Genoots. Amsterdam* **18** (1901): 343–366. **Kramp.**

De grenslanden van China in het bijzonder Mandsjoerië. Door F. G. Kramp.

China. **Selby.**

As the Chinese See Us. By Thomas G. Selby. London: T. Fisher Unwin, 1901. Size 8 × 5, pp. 254. *Price* 6*s.* *Presented by the Publisher.*

In a series of cleverly written dialogues the writer endeavours to illustrate the Chinese point of view on various questions affecting the relations between China and Europe. His qualifications for the task are not stated, but he appears to speak with a considerable knowledge of Chinese history and modes of thought.

China—Kiauchau. *Globus* **79** (1901): 141–143. ——

Kiautschou im Jahre 1899–1900.

China—Manchuria. **Hosie.**

Manchuria, its People, Resources and Recent History. By Alexander Hosie. London: Methuen & Co., 1901. Size 9 × 6, pp. xii. and 294. *Map and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publishers.*

This will be specially noticed.

China—Yunnan. Litton.

Trade of Ssumao and Mengtse for the year 1899. Foreign Office, Annual No. 2542, 1900. Size 9½ × 6, pp. 10. *Sketch-map.* *Price* 2½*d.*

The hopes of trade development entertained on the opening of Sumao to foreign commerce in 1897 have so far been falsified.

China and Central Asia. Puini.

Atti Terzo Congresso G. Italiano, Firenze, 1898 (vol. ii.): 401–422.

Alcune notizie sulle prime relazioni della Cina co' paesi d'Occidente. Memoria del Prof. Carlo Puini. *With Map.*

Chinese Turkestan. *J.R. Asiatic S.* (1901): 295–300. Stein.

Archæological Work about Khotan. By M. A. Stein, PH.D.

French Indo-China. *Rev. G.* **48** (1901): 283–299. Massieu.

Les territoires militaires du Tonkin. Par M^me^ Isabelle Massieu.

India. *Indian Antiquary* **30** (1901): 106–110. Fleet.

Notes on Indian History and Geography. By J. F. Fleet.

Identification of some ancient localities in South-West India.

India. *B.S.G. Lisboa* **17** (1898–1899): 355–367. Pereira.

De Lisboa a Cochim em 1505. Gabriel Pereira.

An account of the voyage to India of Francisco de Almeida, first viceroy, transcribed from the manuscript volume of Valentim Fernandes, entitled 'De insulis et peregrinatione lusitanorum.'

India—Bengal. *Indian Antiquary* **30** (1901): 54–63, 81–97. Stein.

Notes on an Archæological Tour in South Bihar and Hazaribagh. By M. A. Stein, PH.D. *With Illustrations.*

India—Famine. *Imp. and Asiatic Quarterly Rev.* **11** (1901): 225–242. Elliott.

The Famine in India, 1899–1900. No. 1. By Sir Charles Elliott, K.C.S.I., etc.

India—Malabar. *B. Madras Gov. Museum (Anthropology)* **4** (1901): 66–78. ———

Nayādis of Malabar. *With Plates.*

On the lowest caste among the Hindus of Malabar.

India—Statistics. *J.R. Statistical S.* **64** (1901): 31–72. Danvers.

A Review of Indian Statistics. By F. C. Danvers. *With Diagram.*

Shows the general development of India since 1840.

Indian Ocean—Laccadives, etc. *B.S.G. Lisboa* **17** (1898–1899): 345–353. Pereira.

As ilhas de Dyve—Descripção anonyma do seculo xvi. Gabriel Pereira.

This anonymous account, which contains some interesting details respecting the Laccadives and adjoining island groups, is contained in the manuscript volume of Valentim Fernandes, now in the National Library at Lisbon.

Japan. *Deutsch. Rundschau G.* **23** (1901): 306–308. Yokoyama.

Der Ausbruch des Vulcans Adatara in Japan. Von Prof. Dr. M. Yokoyama. *With Map and Illustrations.*

This eruption of Adatara, a volcano of the central chain of Northern Japan, took place on July 7, 1900.

Japan—Hiogo and Osaka. Hall.

Trade of Hiogo and Osaka for the year 1899. Foreign Office, Annual No. 2564. 1901. Size 9½ × 6½, pp. 22. *Price* 1½*d.*

The manufacture and export of cotton yarn continue to increase rapidly, and the latter reached a total value of nearly two and a half millions in 1899. The total trade, however, decreased by over 7 per cent.

Japan—Railways. Baltzer.

M. Deutsch. Ges. Natur- u. Völkerkunde Ostasiens **8** (1900): 105–143.

Mittheilungen aus dem Japanischen Eisenbahnwesen und über den Plan einer Hochbahnverbindung in Tokyo. Von F. Baltzer. *With Map and Plans.*

Korea. *Izvestiya Imp. Russ. G.S.* **36** (1900): 463–501. Schmidt.

News from the Korea-Sakhalin Expedition. By — Schmidt. [In Russian.]

Korea. *Izvestiya Imp. Russ. G.S.* **36** (1900): 502–518. Zvegintzov.

Journey in Northern Korea. By A. Zvegintzov. [In Russian.] *With Map.*

Malay Archipelago. **Wichmann.**
Tijds. K. Ned. Aard. Genoots. Amsterdam **18** (1901): 229–232.
Nog eens de Doif-eilanden. Door Prof. Dr. Arthur Wichmann.
Further notes on the cartographical history and nomenclature of an island group west of New Guinea.

Malay Archipelago—Borneo. **Spaan.**
Tijds. K. Ned. Aard. Genoots. Amsterdam **18** (1901): 199–224.
Een landreis van Berouw naar Samarinda. Door A. H. Spaan. *With Map.*
On a journey through the eastern parts of the Kotei Sultanate.

Malay Archipelago—Borneo and Java. *B.S.R.G. d'Anvers* **25** (1901): 5–44. **Huysmans.**
Une exploration dans le Sultanat de Sambas (Bornéo) et un voyage dans l'île de Java. Par M. le Major Huysmans.
During a visit to the north-west division of Dutch Borneo the author took part in an expedition against the Dayaks, whom he thus describes from personal knowledge.

Malay Archipelago—Celebes. **Riedel.**
Tijds. K. Ned. Aard. Genoots. Amsterdam **18** (1901): 225–228.
De Poïgar-rivier in het landschap Bolaäng Mongondon, Noord-Selebes. Door Dr. J. G. F. Riedel. *With Map and Plates.*

Malay Archipelago—Java. **Bodemeijer.**
Tijds. Indische Taal-, Land- en Volkenk. **43** (1901): 311–330.
Rapport naar aanleiding van de Nota betreffende het Tengger-gebied van den heer H. M. La Chapelle, opgenomen in deel xli. van het Tijdschrift voor Indische taal-, land- en volkenkunde. Door Ch. E. Bodemeijer.
A criticism of certain points in Mr. La Chapelle's paper.

Malay Archipelago—Java—Batavia. **Brandes.**
Tijds. Indische Taal-, Land- en Volkenk. **43** (1901): 248–274.
Een Plattegrond van Batavia van 1632. Door Dr. J. Brandes. *With Plate.*
On an old plan of Batavia represented on a medal now in the Teyler Museum at Haarlem.

Malay Archipelago—Lombok. **Eerde.**
Tijds. Indische Taal-, Land- en Volkenk. **43** (1901): 290–310.
Aanteekeningen over de Bodha's van Lombok. Door J. C. van Eerde.
On an agricultural tribe in Lombok.

Malay Archipelago—Timor. **Niermeyer.**
Tijds. K. Ned. Aard. Genoots. Amsterdam **18** (1901): 274–276.
De Kustlijnen van Timor en Roti. Door J. F. Niermeyer. *With Map.*
On the rectifications introduced by the recent Dutch scientific expedition.

Persia. *Questions Dipl. et Colon.* **11** (1901): 284–289. **Tuillier.**
La Perse et sa situation intérieure. Par Dr. A. P. Tuillier.

Russia—Caucasus. *Izvestiya Imp. Russ. G.S.* **36** (1900): 227–298. **Bush.**
Description and preliminary results of a third Journey to the North-West Caucasus in 1899. By N. A. Bush. [In Russian.]

Russia—Caucasus. *Izvestiya Imp. Russ. G.S.* **36** (1900): 299–323. **Fomin.**
Preliminary Account of a Botanical-Geographical Excursion in the Eastern Caucasus. By A. V. Fomin. [In Russian.]

Russia—Caucasus. **Merzbacher.**
Aus den Hochregionen des Kaukasus. Wanderungen, Erlebnisse, Beobachtungen, von Gottfried Merzbacher. 2 vols. Leipzig: Duncker & Humblot, 1901. Size 10 × 6½, pp. (vol. i.) xxxviii. and 958, (vol. ii.) x. and 964. *Maps and Illustrations. Presented by the Author.*
A notice of this handsome work will be given elsewhere.

Russia—Siberia. **Berg and Ignatow.**
Les lacs salés Séléty-Denghiz, Téké et Kizil-kak du district d'Omsk. Essai physico-géographique. Par L. Berg et P. Ignatow. [In Russian.] Moscow, 1901. Size 10½ × 7½, pp. 162. *Maps and Illustrations. Presented by the Authors.*
This contains, in addition to the limnological matter, some information on the general physical geography and geology of the Omsk district, with a few notes on the Kirghiz.

Russia—Siberia. **Obruchef.**

Orographie und Tektonik Transbaikaliens auf grund neuester Russischer, von 1895–1898 ausgeführter Forschungen. Vortrag gehalten auf dem VII. Internationalen Geographen-Kongress in Berlin im Jahr 1899, von Berg-Ingenieur W. A. Obrutschew. (Sonderabdruck aus den Verhandlungen des VII. Internationalen Geographen-Kongresses in Berlin, 1899.) Berlin, 1900. Size 10 × 7, pp. 192–206. *Map.*

Russia—Siberia. **Seebohm.**

The Birds of Siberia. A Record of a Naturalist's Visits to the Valleys of the Petchora and Yenesei. By Henry Seebohm. London: John Murray, 1901. Size 9½ × 6½, pp. xx. and 512. *Map and Illustrations. Price* 12*s. net. Presented by the Publisher.*

A new edition, combined in one volume, of Mr. Seebohm's well-known works, entitled 'Siberia in Europe,' and 'Siberia in Asia,' which described his journeys in 1875–77 to the valleys of the Pechora and Yenesei. The work is produced in an attractive style, and deserves a place among the best productions of naturalist travellers.

Russia—Siberia. *Rev. G.* **48** (1901): 181–200. **Vallée.**

La Sibérie et le grand Transsibérien. Par Léon Vallée.

Russian Central Asia. *Ann. G.* **10** (1901): 148–164. **Saint-Yves.**

Transalaï et Pamirs. Par G. Saint-Yves. *With Plates.*

A Study in Central Asian Orography.

Russian Turkestan. *Izvestiya Imp. Russ. G.S.* **36** (1900): 332–336. **Bogdanov.**

Lake Chatir-kul. By P. Bogdanov. [In Russian.] *With Map.*

Turkey—Palestine. *B.S.G. Lille* **35** (1901): 228–246. ——

Notes sur la Palestine.

AFRICA.

Abyssinia. *Atti Terzo Congresso G. Italiano, Firenze* 1898 (vol. ii.): 206–219. **Perini.**

Il concetto dell' unità etiopica. Memoria del Capitano Ruffillo Perini.

The writer lays stress on the absence of unity both in the country and people of Abyssinia.

Algeria. *Le Globe, B.S.G. Genève* **40** (1901): 36–43. **Gautier.**

Causerie à propos de l'observation de l'éclipse totale de soleil du 28 mai 1900 en Algérie. Par M. le Prof. Raoul Gautier.

Algeria—Aures Mts. *Tour du Monde* **7** (1901): 133–156. **l'Harpe.**

Dans le sud Algérien. A travers les montagnes de l'Aurès et dans les Oasis du Souf. Par M. le Lieutenant de l'Harpe. *With Illustrations.*

Basutoland. **Weitzecker**

Atti Terzo Congresso G. Italiano, Firenze, 1898 (vol. i.): 237–244.

La Terra dei Basuto (Africa Australe) e i suoi abitanti. Conferenza del Cav. Giacomo Weitzecker.

British Bechuanaland. *Z. Ges. Erdk. Berlin* **36** (1901): 20–68. **Passarge.**

Beitrag zur Kenntnis der Geologie von Britisch-Betschuana-Land. Von Dr. Siegfried Passarge. *With Map and Illustrations.*

British Central Africa. **Chesnaye.**

A Journey from Fort Jameson to the Kafue River. By C. P. Chesnaye. (From the *Geographical Journal* for January, 1901.) Size 10 × 6½, pp. 8. *Map.*

British East Africa. *Monthly Rec.* (1901): 72–87. **Mardon.**

Trade and the Administration in British East Africa. By Evelyn J. Mardon.

British East Africa—Zanzibar. **Lyne.**

Zanzibar. Annual Report of the Agricultural Department. Zanzibar, 1899. Size 8 × 6½, pp. 34.

The prospects of young plantations of coffee, tea, and cacao, established at Dunga, are said to be encouraging.

Congo State. *B.S.R.G. d'Anvers* **24** (1901): 447–450. **Lemaire.**

Sur la mission scientifique du Katanga. Par M. le Capitaine Lemaire.

An account of the Lemaire expedition, read on October 24, 1900.

Congo State. *Mouvement G.* **18** (1901): 134–137. ——

La mission scientifique du Katanga.

Gives the preliminary results of astronomical and other observations made by the Lemaire expedition.

Congo State—Coffee. *B.S. d'Études Colon.* **8** (1901): 109–116. **Gentil.**

Établissement d'une plantation de caféiers au Congo. Par Louis Gentil.

Congo State—Tsetse fly. *B.S.R.G. d'Anvers* **24** (1901): 451–473. **Lemaire.**

Au Congo. Note sur la mouche tsétsé. Par M. le Capitaine Lemaire.

Describes the author's search, during his journey across Africa, for specimens of the tsetse fly, with a view to determining its range.

Dahome—Railway. *Mouvement G.* **18** (1901): 145–149. ——

Le Chemin de fer du Dahomey. *With Map.*

Egypt—Eastern Desert. *Geolog. Mag.* **8** (1901): 154–161. **Barron and Hume.**

Notes on the Geology of the Eastern Desert of Egypt. By T. Barron and W. F. Hume, D.SC.

French Congo. *Questions Dipl. et Colon.* **11** (1901): 323–329. **Bernard.**

Les territoires du Chari et l'œuvre de M. Gentil. Par M. A. Bernard. *With Map.*

French Congo. *B. Comité l'Afrique Française* **11** (1901): 105–109. **Bernard and Huot.**

La mission Chari-Sangha. Par M. V. Bernard et le dr. Huot. *Map.*

French Congo. *La G., B.S.G. Paris* **3** (1901): 197–202. **Huot.**

Mission Chari-Sangha. Par le Dr. Huot. *With Map.*

These two papers give a full account of the journey described at p. 305 of vol. xvii of the *Journal*.

French Congo. *La G., B.S.G. Paris* **3** (1901): 109–114. **Julien.**

De Ouango à Mobaye par les pays n'sakara et bougbou (29 Mars—9 Avril 1899). Par M. Julien. *With Map and Illustrations.*

French Congo. *B. Comité l'Afrique Française* **11** (1901): 100–104. **Terrier.**

La région du Chari et la Mission Gentil. Par Auguste Terrier. *With Map and Illustration.*

Gives information as to the organization of the Shari territory.

French Congo. *Mouvement G.* **18** (1901): 137–140. **Wauters.**

Le problème du Wam. Par A. J. Wauters. *With Map.*

French Guinea. *Ann. G.* **10** (1901): 165–176. **Chevalier and Cligny.**

La Casamance. Par MM. A. Chevalier et Ad. Cligny. *With Plates.*

French West Africa. *Miss. Catholiques* **33** (1901): 94, 106, 117, 128, 174. **Hacquard.**

Promenade au Mossi. Par Mgr. Hacquard. *With Map and Illustrations.*

French West Africa—Ivory Coast. *La G., B.S.G. Paris* **3** (1901): 219–221. **Noll.**

La mission du lieutenant Dromard. Par Ned Noll. *With Map.*

On surveys in the region east of the lower Kavalli.

French West Africa—Senegal. *B.S.G. de l'Est* **22** (1901): 61–71. **Rambaud.**

Voyage au Sénégal. Par M. Pierre Rambaud.

German East Africa. *M. Deutsch. Schutzgeb.* **14** (1901): 20–39. **Beringe.**

Aus den Berichten des Herrn v. Beringe über seine Reisen im Gebiet der Kirunga-vulkane. *With Map and Illustrations.*

See note in May *Journal* (vol. xvii. p. 529).

German East Africa. *M. Deutsch. Schutzgeb.* **14** (1901): 40–61. **Böhler.**

Denkschrift zur Karte von Ost-Usambara. Von Böhler. *With Map and Illustrations.*

The map is the result of a survey commenced in 1896 for the fixing of the limits of land-concessions in Usambara. It is on the scale of 1 : 50,000.

German South-West Africa. *Deutsche Rundschau G.* **23** (1901): 252–258. **Dinter.**

Kreuz- und Querzüge in Deutsch-Südwest-Afrika. Von Kurt Dinter. *With Illustrations.*

German South-West Africa. *Globus* **79** (1901): 41–44. **Kannengiesser.**

Deutsch-Südwestafrika im Jahre 1900. Von G. A. Kannengiesser.

The writer thinks that the threatened influx of Boers in the south, and the English mining enterprise in the north, must be met by increased German immigration.

German South-West Africa. *Deutsch. Kolonialblatt* **12** (1901), 186–189. **Lindequist.**

Die wirthschaftlichen Aussichten Deutsch-Sudwestafrikas im Vergleich mit dem übrigen Sudafrika.

The writer considers that German South Africa is in no way inferior to the greater part of the British territory from an economic point of view.

Kamerun. *Deutsch. Kolonialblatt* **12** (1901): 183–186. **Von Stein.**

Forschungsexpedition im südöstlichen Kamerun.

Describes the expedition up the Ngoko already referred to in the *Journal* (vol. xvii. p. 431). Lieut. von Stein gives to the upper river a direction from the north, which differs from that assigned to it by the late Dr. Plevn.

Madagascar. *La G., B.S.G. Paris* **3** (1901): 89–108. **Colin.**

Deux missions scientifiques sur les côtes occidentale et orientale de Madagascar. Par E. Colin, S.J. *With Illustrations.*

Marocco. *Z. Ges Erdk. Berlin* **35** (1900): 365–417. **Fischer.**

Zur Klimatologie von Marokko. Von Prof. Dr. Theobald Fischer. *With Map.*

A note on this paper will be given.

Marocco. *Meteorolog. Z.* **18** (1901): 76–79. **Hann.**

Klima der Westküste von Marokko, Mogador. Von J. Hann.

Marocco. *Le Globe, B.S.G. Genève* **12** (1900–1901): 64–77. **Tavel.**

Récits de voyage au Maroc. Par M. le prof. Dr. E. Tavel.

Deals only with the better-known parts of Marocco.

Portuguese West Africa—Angola. **Nightingale.**

Trade of Province of Angola for the year 1899. Foreign Office, Annual No. 2555, 1901. Size 10 × 6½, pp. 18. *Price* 1½*d.*

The imports from Germany show an increase of £32,450, while those from the United Kingdom had decreased by £1750; but it is hinted that this may be due to want of caution on the part of German traders, who sometimes suffer severe losses in consequence. Though still resulting in a deficit, the working of the railway shows increased receipts and diminished expenses as compared with 1890.

Sahara. *B.S.G. Lyon* **17** (1901): 138–145. **Foureau.**

La traversée du Sahara. Par M. Foureau.

Sahara. *B.S.G. Lyon* **17** (1901): 168–174. **Tignol.**

La Mission Blanchet. Par M. L. Tignol.

Sahara—Tuat. *Rev. Française* **26** (1901): 222–227. **Vasco.**

L'occupation du Touat. Par G. Vasco. *With Map.*

St. Helena. **Sterndale.**

St. Helena. Report for 1899. Colonial Reports, Annual No. 309, 1900. Size 9½ × 6, pp. 16. *Price* 1*d.*

South Africa. *J.R. Colonial I.* **32** (1901): 301–337. **Wallace.**

Agriculture in South Africa. By Prof. Robert Wallace.

Prof. Wallace's opinion, that South Africa will never be developed through its agriculture, elicited a considerable amount of criticism in the discussion which followed the paper.

South Africa—Basutoland. ——

Basutoland. Report for 1899-1900. Colonial Reports, Annual No. 313, 1901. Size 9½ × 6, pp. 68. *Price* 3½*d.*

Spanish Colonies. *B.S.G. Madrid* **42** (1900): 174–188. **Conrotte.**

Colonias españolas en Africa y métodos apropiados á su explotación. Por D. Manuel Conrotte.

Spanish West Africa. *B.S.G. Madrid* **42** (1900) (Separate Memoir, 74 pp.). **Duro.**

El Derecho á la ocupación de territorios en la Costa occidental de Africa

discutido en la Conferencia internacional de Paris en los años de 1886 á 1891. Por D. Cesáreo Fernández Duro.

On the Spanish claims to territory in West Africa, and the history of the negotiations with France.

Tunis. *Rev. Française* **26** (1901): 227–230. **Barré.**

Le Djérid Tunisien. Par P. Barré.

Tunis. *Rev. Française* **26** (1901): 129–135. **Demanche.**

L'invasion sicilienne en Tunisie. Par M. G. Demanche.

On the ever-increasing Italian immigration into Tunis.

Tunis. *Travel* **5** (1901): 544–552. **Sloan.**

Off the Beaten Track; or, with Caravan, Camp, and Camera into the Interior of Tunisia. By the Rev. A. D. Sloan. *With Illustrations.*

Description of a trip south-east from Kairwan.

Tunis—Uthina. *Rendiconti R.A. Lincei* **9** (1900): 681–688. **Cesano.**

La Colonia di Uthina. Nota della sig^na^ Lorenzina Cesano.

Uthina was one of the oldest Roman colonies in the province of Africa.

West Africa. *Ann. Hydrographie* **29** (1901): 104–111. **Kutter.**

Zur Küstenkunde Westafrikas. Aus dem Reisebericht S.M.S. "Habicht," Kommandant Korv.-Kapt. Kutter. *With Chart.*

The chart shows the Congo mouth and its islands, which are said to be incorrectly drawn in the British Admiralty chart.

West Africa—Historical. **Gomes and Pereira.**

B.S.G. Lisboa **17** (1898–1899): 267–293.

Diogo Gomes—As relações do descobrimento da Guiné e das ilhas dos Açores, Madeira e Cabo Verde, versão do latim por Gabriel Pereira.

A Portuguese version of the narratives of Diogo Gomes, relating to the discovery of Guinea and the Atlantic archipelagoes, written in Latin by Martin Behaim, and included in the collection of Valentim Fernandes.

West Africa—Kola. *M. Deutsch. Schutzgeb.* **14** (1901): 8–14. **Zech.**

Ueber Kola in Westafrika. Von Graf Zech. *With Illustrations.*

A note on this paper appears elsewhere.

West Africa—Railways. *Questions Dipl. et Colon.* **11** (1901): 401–415. **Aspe-Fleurimont.**

La question des Chemins de fer dans l'Afrique occidentale. Par M. Aspe-Fleurimont.

On the best means of providing railways for French West Africa.

NORTH AMERICA.

America—Norse Discoveries. *B. American G.S.* **33** (1901): 1–18. **Dieserud.**

Norse Discoveries in America. By Juul Dieserud.

Canada. *Church Miss. Intelligencer* **52** (1901): 182–194. **Lofthouse.**

In a Desolate Land. Journal of Archdeacon Lofthouse. *With Map.*

Account of a journey of 3000 miles from Winnipeg across the Barren Lands to Hudson bay, and back.

Canada—Lake Basins. *Geolog. Mag.* **8** (1901): 97–101. **Parkinson.**

Some Lake Basins in Alberta and British Columbia. By J. Parkinson. *Plate.*

Canada—New Brunswick. **Ganong.**

B. Nat. Hist. S. New Brunswick **4** (1901): 313–340.

Notes on the Natural History and Physiography of New Brunswick [*continued*]. By W. F. Ganong. *With Maps.*

Canada—Rocky Mountain Region. *B. Geolog. S. America* **12** (1901): 57–92. **Dawson.**

Geological Record of the Rocky Mountain Region in Canada. Address by the President, George M. Dawson.

Canada—Rocky Mountains. **Collie.**

Exploration in the Canadian Rocky Mountains. By Prof. J. Norman Collie, F.R.S. (From the *Geographical Journal* for March, 1901.) Size 10 × 6½, pp. 22. *Map and Illustrations.*

Mexico. **Biorklund.**

Trade of Mexico for the year 1899. Foreign Office, Annual No. 2546, 1901. Size 9½ × 6, pp. 46. *Price* 2½*d.*

This is the second report on Mexican trade in 1899 issued within the last few months (cf. *Journal*, vol. xvii. p. 452).

Newfoundland. *Rev. G.* **48** (1901): 201–210. **Charpentier.**

La question du French Shore. Par M. Charpentier. *With Map.*

Newfoundland. *Fortnightly Rev.* **69** (1901): 359–363. **Willson.**

The Newfoundland Question. Is a Present Settlement with France desirable? By Beckles Willson.

The writer urges that, instead of indemnifying France for the cession of her supposed rights, the duty of Great Britain is to compensate the colonists for wrongs done to them, not by France, but by the Imperial Government through the allowance of French pretensions. The distinction seems somewhat academical.

United States. *American J. Sci.* **11** (1901): 185–190. **Gould.**

Notes on the Geology of parts of the Seminole, Creek, Cherokee, and Osage Nations. By C. N. Gould.

On the results of a reconnaissance in the north-west of the Indian territory and a part of Oklahoma.

United States—Arkansas. *J. Geology* **9** (1901): 47–50. **Purdue.**

Valleys of Solution in Northern Arkansas. By A. H. Purdue. *With Illustrations.*

On examples of valleys due to the differential solution of the rocks of a district.

United States—Chicago. **Wyndham.**

Trade of Chicago and District for the year 1900. Foreign Office, Annual No. 2566, 1901. Size 10 × 6½, pp. 66. *Price* 3½*d.*

It is stated that the buyers of more than twenty states now make most of their purchases in Chicago, while within a radius of 500 miles there is a population of over 40,000,000.

United States—Cotton. *Export* **23** (1901): 186–188. ——

Die amerikanische Baumwoll-Produktion und Industrie.

Translation of an article in the *Times*.

United States—Indiana. *J. Geology* **9** (1901): 123–129. **Dryer.**

Certain peculiar Eskers and Esker Lakes of North-Eastern Indiana. By C. R. Dryer. *With Sketch-maps.*

United States—Kansas and Oklahoma. *American J. Sci.* **11** (1901): 263–268. **Gould.**

Tertiary Springs of Western Kansas and Oklahoma. By C. N. Gould.

It is often these springs alone which permit stock farming over large areas.

CENTRAL AND SOUTH AMERICA.

Andes. *La G., B.S.G. Paris* **3** (1901): 261–278. **Rabot.**

Le conflit chilo-argentin et les phénomènes de capture dans la Cordillère des Andes. Par Charles Rabot. *With Map and Illustrations.*

Argentine Republic. **Lahille.**

Informe preliminar del Viaje de Exploración del *Azopardo* al Golfo San Matias. Por el doctor F. Lahille. Buenos Aires, 1900. Size 8½ × 5½, pp. 78.

A brief outline of the scientific results of the voyage of the *Azopardo* in 1899.

Brazil. *Petermanns M.* **47** (1901): 49–53. **Katzer.**

Das Gebiet an der Mündung des Trombetas in den Amazonas. Von Dr. Friedrich Katzer. *With Map.*

Brazil. **Temple.**

Trade of Pará for the year 1900. Foreign Office, Annual No. 2580, 1901. Size 9½ × 6, pp. 26. *Diagram.* *Price* 3½*d.*

Brazil and French Guiana. ——

Frontières entre le Brésil et la Guyane Française. Mémoire présenté par les États Unis du Brésil au Gouvernement de la Confédération Suisse, Arbitre choisi selon les stipulations du Traité conclu à Rio-de-Janeiro, le 10 Avril 1897 entre le Brésil et la France. 6 vols. Vols. iv. and v.—L'Oyapoc et l'Amazone. Par

Joaquin Caetano da Silva. Vol. vi. Atlas. Paris: A. Lahure, 1899–1900. Size 9½ × 6½; Atlas, 22½ × 16, pp. (vol. i.) xviii. and 278; (vol. ii.) iv. and 196; (vol. iii.) 262; (vol. iv.) xxxviii. and 460; (vol. v.) 506. *Maps. Presented by the Brazilian Government.*

British Honduras. **McKinney.**

British Honduras. Report for 1899. Colonial Report, Annual No. 310. 1900. Size 9½ × 6, pp. 30. *Price* 2*d.*

Although mahogany and logwood still play a preponderating part in the list of exports, it is stated that there are grounds for hoping that an agricultural industry may in time be organized.

Costa Rica and Colombia. *Rev. Française* **26** (1901): 168–171. ——

L'arbitrage entre Costa-Rica et Colombie. Par G. V. *With Map.*

French and Brazilian Guiana. **Breukelman.**

Tijds. K. Ned. Aard. Genoots. Amsterdam **18** (1901): 262–271.

De beslissing in het Fransch-Braziliaansch geschil. Door J. B. Breukelman. *With Map.*

French Guiana and Brazil. *B.S.R.G. d'Anvers* **24** (1901): 480–485. **Georlette.**

Le Contesté franco-brésilien. L'Aricary. Par M. F. A. Georlette. *With Map.*

On the recent boundary award.

Grenada. **Probyn.**

Grenada. Report for 1899. Colonial Reports, Annual No. 316. 1900. Size 9½ × 6, pp. 54. *Price* 3*d.*

Leeward Islands. **Gordon.**

Leeward Islands. Report for 1899. Colonial Reports, Annual No. 308, 1900. Size 9½ × 6, pp. 48. *Price* 2½*d.*

Peru. *Deutsche Rundschau G.* **23** (1901): 259–262. **Nusser-Asport.**

Expedition Viellerobe vom Ucayali zum Inambary. Von Chr. Nusser-Asport.

This expedition was referred to in the *Journal* for 1899 (vol xiv. p. 214).

St. Lucia. **Egerton.**

Saint Lucia. Report for 1899. Colonial Reports, Annual No. 311, 1900. Size 9½ × 6, pp. 38. *Price* 2½*d.*

St. Vincent. **Drayton.**

St. Vincent. Report for 1899. Colonial Reports, Annual No. 312. 1901. Size 9½ × 6, pp. 26. *Price* 2*d.*

Venezuela. *B.S.G. Com. Bordeaux* **27** (1901): 109–112. **Humbert.**

Un Gibraltar ignoré. Par M. J. Humbert.

The Gibraltar in question is a small town at the southern extremity of the Lake of Maracaibo, which has been the scene of some important historic events.

West Indies—Agricultural Conference. *West Indian B., Extra No.*, pp. 22. ——

Report of Proceedings at the West Indian Agricultural Conference, 1901.

At this conference, which met in January last, a number of questions relating to the agricultural development of the West Indies were discussed.

AUSTRALASIA AND PACIFIC ISLANDS.

Hawaii—Sugar-planting. **Rossi.**

Le Piantagioni di Canna da Zucchero nelle Isole Hawaii. Rapporto del cav. Egisto Rossi. (B. Ministero Affari Esteri, Marzo, 1901.) Size 9 × 6½, pp. 16.

New South Wales. **Coghlan.**

Agriculture in New South Wales, pp. 48. Forty years of Progress in New South Wales, p. 8. The climate of New South Wales, pp. 10. *Map and Section.* The Fauna of New South Wales, pp. 16. The mining industry of New South Wales, pp. 42. *Map.* The timber resources of New South Wales, pp. 16. All by T. A. Coghlan. Sydney, 1900. Size 9 × 5½. *Presented by the Agent-General for New South Wales.*

New South Wales. *Records Australian Museum* **4** (1901): 17–21. **North.**

The Destruction of Native Birds in New South Wales. By Alfred J. North.

New Zealand. *J. Polynesian S.* **9** (1900): 211–233. **Smith.**

The *Aotea* Canoe. The Migration of Turi to Aotea-Roa (New Zealand). Translated and Annotated by S. Percy Smith.

An account, from native sources, of the arrival of a party of settlers on the Taranaki and Cook strait coasts, about A.D. 1350.

Oceania—Railways. *Rev. G.* **48** (1901): 211–217. **Barré.**

Les chemins de fer océaniens. Par Paul Barré.

The railways of the Malay archipelago are included.

Pacific Fauna. *P.A. Nat. Sci. Philadelphia* (1900): 568–581. **Pilsbry.**

The Genesis of Mid-Pacific Faunas. By Henry A. Pilsbry.

Place-names. *R.G.S. Australasia (Victoria)* **18** (1900): 7–29. **Forbes.**

Orthography of Geographical Place-names. By E. J. Forbes.

This paper is a plea for system in the bestowal of names to new places. In the discussion which followed, considerable differences of opinion were expressed, some of the speakers advocating native, others English, names.

Samoa. **Trood.**

Trade of Samoa for the year 1900. Foreign Office, Annual No. 2561, 1901. Size 10 × 6½, pp. 8. *Price* ½*d.*

The planting of cacao is now engaging much attention. Coffee has been a failure owing to disease, but vanilla, kola, and rubber are more promising.

POLAR REGIONS.

Greenland. *G. Tidskrift* **16** (1901): 34–54. **Amdrup.**

Den østgrønlandske Kystexpedition 1900. Ved Premierløjtnant G. Amdrup. *With Map.*

Greenland—Denmark Island. *Meteorolog. Z.* **18** (1901): 5–10. **Woeikof.**

Klima und Föhne der Dänemark-Insel, Scoresby-Sund. Von A. Woeikof.

Spitsbergen. **Conway.**

The Rise and Fall of Smeerenburg, Spitsbergen. By Sir Martin Conway. (Privately printed.) Size 10 × 6½, pp. 24. *Presented by the Author.*

An interesting account of European (principally Dutch) whaling enterprise in Spitsbergen in the seventeenth century.

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Moraines. *Sitzb. A.W. München* (1900): 533–540. **Finsterwalder.**

Ueber die innere Struktur der Mittel-moränen. Von S. Finsterwalder. *Illustr.*

Oceanography. **Chun.**

Aus den Tiefen des Weltmeeres. Von Carl Chun. Schilderungen von der Deutschen Tiefsee-Expedition. Jena: G. Fischer, 1900. Size 11 × 8, pp. viii. and 550. *Map and Illustrations.*

This will be noticed elsewhere in the *Journal*.

Oceanography—Map. *B.S.G. de l'Est* **22** (1901): 5–22. **Thoulet.**

Projet d'une carte générale des grandes profondeurs océaniques. Par M. J. Thoulet.

Seismology. *B. Comité Géolog. St.-Pétersbourg* **19** (1900): 31–53. **Montessus-de-Ballore.**

Les régions Balkaniques et l'Anatolie Séismique. F. de-Montessus-de-Ballore. [In Russian, with *résumé* in French.] *With Map.*

Sonorous Sand. *Sitzb. A.W. München* (1901): 15–33. **Günther.**

Akustisch-Geographische Problème. Von S. Günther.

The writer proposes to collect and discuss the material now available on the subject of natural acoustic phenomena, and begins in this paper with that of sonorous sand.

Zóo-geography. *C. Rd.* **132** (1901): 802–805. **d'Herculais.**

Le grand Acridien migrateur américain (*Schistocerca americana*, Drury): migrations et aire de distribution géographique. Note de M. J. Künckel d'Herculais.

GENERAL.

Exploration. **Stanley.**

Fields for Future Explorers. By Sir Henry M. Stanley. (From the *Windsor Magazine*, January, 1901, pp. 201-206.) Size 10 × 6½. *Map and Illustrations.*

Hints to Travellers. **Coles.**

Hints to Travellers, scientific and general. Edited for the Council of the Royal Geographical Society, by John Coles. Eighth Edition, Revised and Enlarged. 2 vols. Vol. i.—Surveying and Practical Astronomy. Vol. ii.—Meteorology, Photography, Geology, Natural History, Anthropology, Industry and Commerce, Medical, etc. London: Royal Geographical Society, 1901. Size 7 × 5, pp. (vol. i.) x. and 436; (vol. ii.) viii. and 266. *Maps and Illustrations. Price 15s. net.*

In this edition, not only has the whole subject-matter been thoroughly revised and enlarged, but two sections, those on meteorology and medical hints, have been entirely re-written, by Dr. H. R. Mill and Dr. W. H. Crosse respectively. The work is for the first time divided into two volumes, the first of which deals solely with surveying and practical astronomy, and includes a complete set of trigonometrical tables for the computation of results, taken, by permission, from Raper's well-known treatise.

Hydrography.

Account of the operations of the Marine Hydrographical Department of the Ministry of Marine, 1898. [In Russian.] St. Petersburg, 1899. Size 9½ × 6½, pp. 460 and 24. *Maps.*

Ice-navigation. *Scottish G. Mag.* **17** (1901): 175-185. **Gulston.**

Some Notes on the Baltic and Arctic Voyages of the *Ermack* in 1899. By Arthur Gulston.

Irrigation. **Jung.**

Beiträge Kolonialpolitik u. Kolonialwirtschaft **2** (1900-1901): 353-363.

Künstliche Bewässerung und ihre Anwendung in unseren Kolonien. Von Dr. Emil Jung.

Malaria. **Stephens and Others.**

Reports to the Malaria Committee of the Royal Society. Third Series. London: Harrison & Sons, 1900. Size 8½ × 5½, pp. 46. *Map, Plans, and Diagrams. Price 2s. Presented by the Royal Society.*

This instalment contains reports by Drs. Stephens, Christophers and Daniels, dealing, among other subjects, with malarial fever on railways under construction, the distribution of *Anopheles* in Africa, and the question of prophylaxis.

Meat Trade. *Deutsch. G. Blätter* **24** (1901): 25-35. **Jung.**

Viehstand und Fleischhandel in Nord-amerika, Australien und den La Plata-Staaten. Von Dr. Emil Jung.

Medical Geography—Malaria. *Nature* **63** (1901): 494-497. **Fielding-Ould.**

Malaria and its Prevention. By Dr. R. Fielding-Ould. *Chart and Illustration.*

Spanish Colonies. *B.S.G. Madrid* **42** (1900) (*Separate Memoir*, 110 pp.) **Labra.**

Las Colonias españolas después del Tratado de Paris de 1898. Por D. Rafael M. de Labra.

Time Signals.

List of Time Signals, established in various parts of the World. Sixth Edition. 1901. London: J. D. Potter. Size 10 × 6½, pp. 82. *Price* 1s. *Presented by the Hydrographer, Admiralty.*

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

England and Wales. **Bartholomew.**

Reduced Ordnance Survey of England and Wales. Scale 1: 126,720 or 2 stat. miles to an inch. Sheet: 14, Lincoln Fens. J. Bartholomew & Co., Edinburgh. 1901. *Price 2s. Presented by the Publishers.*

England and Wales. **Johnston.**

Cycling and Automobile Maps of London and the East, London and the West, London and the South, and Environs of London. Scale 1 : 190,080 or 3 stat. miles to an inch. W. & A. K. Johnston, Edinburgh & London. *Price* 1*s.* 6*d. each sheet. Presented by the Publishers.*

These are sheets of Johnston's "Three Miles to an Inch" map of England and Wales, arranged to include the districts for about 60 miles to the east, west, and south of London, and a general map of the environs of London, with circles drawn at intervals of 3 miles from St. Paul's, and the roads suitable for cyclists shown in red. The scale is small, but they will be useful when no map on a larger scale is available. Contours at intervals of 500 feet are shown, but these are, of course, too few and far between to be of much use to the cyclist.

England and Wales. **Ordnance Survey.**

Ordnance Survey of England and Wales:—Revised sheets published by the Director-General of the Ordnance Survey, Southampton, from May 1 to 31, 1901.

6-inch—County Maps:—

Carnarvonshire, 8 S.E., 12 N.W., 16 N.E., 21 N.W., 22 N.E., S.W., 27 S.E., 34 N.E., 34 S.W., 36 N.E., 40 N.E. (40 S.E. and 41 S.W.), 42 N.E., 43 S.E., 44 N.E., 44 S.W., 45 S.W., 46 S.W. **Cumberland,** 3 N.E., S.E., 4 S.W., 8 N.W., N.E., 9 N.E., S.W., 12 N.E., S.E., 15 N.E., 16 N.W., 18 S.W., S.E., 21 S.W., 22 N.W., 23 N.W., S.E., 24 S.E., 26 N.W., S.W., 30 S.E., 33 N.E., 34 N.E. **Derbyshire,** 45 N.W., 46 N.W., 48 N.E., 50 S.E., 56 N.E. **Glamorgan,** 3 N.W., S.W., 19 N.W. **Merionethshire,** 12 N.E., 18 N.E. **Northamptonshire,** 6 S.W., 11 S.W., 12 S.W., 15 S.W., 19 N.W., 24 S.E., 25 N.E., 26 S.W., 33 N.W., 38 S.W., 44 S.E., 46 S.W. **Nottinghamshire,** 37 N.W., 38 S.E., 45 N.E. **Wiltshire,** 15 N.E., 25 S.E., 45 S.E., 48 S.W., 61 N.E. 1*s. each.*

25-inch—County Maps:—

Bedfordshire, X. 11, 15, 16; XI. 1, 5, 6, 9, 10, 13, 14; XII. 1, 9, 11, 12, 14, 15, 16; XIII. 11, 14, 16; XIV. 13; XV. 4, 8, 12, 15, 16; XVI. 1, 2, 5, 6, 7, 8, 9, 12, 13; XVII. 1, 2, 3, 4, 5, 6, 7, 9, 11, 12; XVIII. 2, 4, 5, 6, 7, 8, 11, 12; XIX. 1, 5, 9, 13; XXI. 11; XXII. 4; XXIV. 3; XXVIII. 10; XXXIII. 5. **Derbyshire,** LII. 3, 4, 7, 8; LIII. 6; LVII. 4, 8, 12. **Huntingdonshire** (Det.), XIII. 11, 14. **Merionethshire,** XIV. 14; XXII. 3; XXIX. 1; XXXII. 16; XXXIII. 7, 14, 15; XXXIV. 5, 6, 10, 16; XXXV. 6, 10, 14; XXXVI. 2, 3, 4, 7, 8, 14, 15; XXXVII. 1, 2, 5, 6, 7, 8, 15; XL. 12, 16; XLI. 5, 8, 9, 12, 13, 14, 15; XLII. 1, 2, 3, 5, 6, 7; XLV. 4, 8, 12; XLVI. 1, 2, 3, 5, 6, 7, 13, 15. **Monmouthshire,** IV. 7, 16; V. 9; VI. 12, 13, 16; X. 12; XI. 2, 12; XII. 2, 5, 7, 11, 12; XIII. 1, 2, 3, 4, 5, 9, 10, 11, 13, 14, 15; XVIII. 1, 2, 4, 5, 9, 13; XIX. 4, 6, 10; XXII. 15; XXXIII. 2. **Shropshire,** II. 9, 13, 14; VII. 8; VIII. 1, 2, 3, 4, 5, 6, 8. **Staffordshire,** XXII. 4, 7, 8, 11, 12, 15, 16; XXIII. 1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16; XXIV. 1, 2, 4, 5, 7, 10, 11, 16; XXV. 3; XXVI. 2; XXXI. 3, 4, 9, 16; XXXII. 3, 5, 6, 7, 8, 11, 12, 15, 16. **Wiltshire,** XXXVIII. 14, 15; XLIV. 3, 4, 6, 7, 10, 12, 14, 15, 16; LI. (1 and 2), 4, 14, 16; LVII. 2, 3; LVIII. 1; LXIV. 6; LXV. 4, 8, 12, 16; LXVI. 1, 2, 13; LXVII. 3, 4, 12; LXX. 4, 8, 12, 16; LXXI. 1, 5, 9, 14, 15. 3*s. each.*
(*E. Stanford, London Agent.*)

Greece. **Grundy.**

Murray's Handy Classical Maps, Græcia. Scale 1 : 633,600 or 10 stat. miles to an inch. Edited by G. B. Grundy, M.A., of Brasenose College, Oxford. London: John Murray, 1901. *Price* 1*s.* 6*d.* 2 *sheets. Presented by the Publisher.*

This is another of Murray's Handy Classical Maps, edited by Mr. G. B. Grundy. An attempt has been made to show the relief by means of a combination of contour-lines and colour-tinting which is not altogether satisfactory, partly owing to the fact that there is not sufficient difference between some of the tints selected, and still more because all plains, at whatever elevation they may be, are shown by one tint of bright green, which, in connection with the orographical tinting, tends to confusion, for naturally one supposes that, in keeping with the rest of the map, all parts coloured in the same way are of one altitude, notwithstanding the explanatory note given. It seems to have been a mistake to attempt two systems of colouring on the same map. Ancient names only are given, and, like the others of the series, the map, which is in two parts, is accompanied by an index to place-names.

Norway. **Norges Geografiske Opmaaling.**

Topografisk Kart over Kongeriget Norge. Scale 1 : 100,000 or 1·6 stat. mile to an inch. Sheets: Bratfjeldet, Fraaholmen, Ljördalen, Storelvedalen, Lodshavn, Egersund, Söndre Osen, Engerdalen, Röst, Skibaasvaer, Ranen, Vardö, Ranseren.

Kiberg, Tana, Bievra, Naesseby.—Norges Geologiske Undersögelse. 1 : 100,000. Sheet : Lillehammer. Norges Geografiske Opmaaling, Kristiania. *Presented by the Norges Geografiske Opmaaling.*

Switzerland. **Swiss Federal Staff.**

Topographischer Atlas der Schweiz. Scale 1 : 25,000. Sheets : Anthy, Beurnevésin, Rankweil, Wesen, Cryon.—1 : 50,000. Sheets : Glurns, Chiavenna. *Price 1 mark each sheet. Presented by the Swiss Federal Staff.*

Vienna. **Artaria.**

Plan der K. K. Reichshaupt und Residenzstadt Wien. Scale 1 : 25,000 or 0·4 stat. mile to an inch. Wien : Artaria & Co., 1901. *Price 2k. Presented by the Publishers.*

ASIA.

Asia. **Service Géographique de l'Armée, Paris.**

Asie. Scale 1 : 1,000,000 or 15·8 stat. miles to an inch. Sheet : Hanoi. Service Géographique de l'Armée, Paris. *Price 1.25 fr.*

Japan. **Japanese Government.**

Map of Japan. Scale 1 : 50,000 or 0·8 stat. mile to an inch. Japanese Government. *Presented by K. Otani, Esq.*

These sheets of the Government survey of Japan include the eastern part of the island of Niphon, extending for about 100 miles to the south-west of Tokio. Elevations are shown by an elaborate series of contour-lines at intervals of 20 feet, and a great deal of detail is given. The lettering is in native character only.

Palestine. **Bartholomew and Smith.**

Topographical and Physical Map of Palestine. By J. G. Bartholomew, F.R.S.E., etc. Edited by George Adam Smith, D.D., LL.D. Scale 1 : 253,440 or 4 stat. miles to an inch. J. Bartholomew & Co., Edinburgh, 1901. *Prices : in sheets unmounted, 5s. ; mounted on cloth and in case, 7s. 6d. ; mounted on rollers and varnished, 12s. 6d. Presented by the Publishers.*

By means of a system of colour-tinting and contours, similar in general appearance to that employed in their well-known reduced Ordnance maps of the British Isles, Messrs. Bartholomew have succeeded in producing a map of Palestine which shows clearly the leading physical features and characteristics of the country, and will doubtless be useful to students and tourists. Ten shades of green and brown have been selected to represent the altitudes of the land from the level of the Mediterranean sea to over 7000 feet, the intervals being every 500 feet up to 2000, and then every 1000 feet. The altitudes below the level of the Mediterranean are specially distinguished, and the depths of the seas are shown by tints of blue for every 500 feet. There are also given as insets, a vegetation map of modern Palestine, a plan of Jerusalem, vertical sections across the country from Jaffa to the plains of Moab, and from Mt. Carmel across the Sea of Galilee to the Jaulan plateau, and, for comparison, a small plan of the environs of London on the same scale as the principal map. Bible and ancient names are distinguished from modern names by the style in which they are written, and an explanation is given of Arabic geographical terms.

AFRICA.

Algeria. **Service Géographique de l'Armée, Paris.**

Carte d'Algérie. Scale 1 : 50,000 or 0·8 stat. mile to an inch. Sheets : Oued Okris, Mansourah, St. Donat. Service Géographique de l'Armée. Paris. *Price 1.50 fr. each sheet.*

Somaliland. **Istituto Cartografico Italiano.**

Carta della Costa Orientale d'Africa da Obbia a Dares-Salem e della Somalia Meridionale. Scale 1 : 500,000 or 7·8 stat. miles to an inch. Sheets : Lugh, Mogadiscio, Meregh, Goscia, Brava. Istituto Cartografico Italiano, Rome, 1899.

These five sheets form part of a map of the southern part of Italian Somaliland and the country to the south as far as Zanzibar, which is now in course of publication by the Italian Military Geographical Institute, and which will consist altogether of thirteen sheets. The area included on the sheets already received lies between the equator and 5° N. lat., and between 38° E. long. and the coast. Much of this region is very imperfectly known, consequently a good deal that is laid down on the sheets is hypothetical, and many blank spaces exist owing to the entire lack of information.

Tunis. **Service Géographique de l'Armée, Paris.**

Carte de Tunisie. Scale 1 : 50,000 or 0·8 stat. mile to an inch. Sheets : Oued Sedjenan, Oued Zerga. Service Géographique de l'Armée. Paris. *Price 1.50 fr. each sheet.*

West Africa. **Chastrey.**

Hydrographie du Congo et de l'Oubanghi de Brazzaville au Poste d'Abiras, avec leurs affluents rive droite d'après les travaux des diverses Missions de 1883 à 1901. Scale 1: 800,000 or 12·7 stat. miles to an inch. By Henry Chastrey. To be obtained of the author at 24 rue du Fer-à-Moulin, Paris. *Price* 30 *fr.*

This map includes the course of the lower Congo from Brazzaville, on Stanley Pool, to the confluence of the Ubangi, and then gives the latter river as far as Abiras, situated about 50 miles east of its great northern bend. It also includes the river Sangha and other smaller tributaries which flow into the Congo and Ubangi from the west. The author, who was with Meister on the Congo, is evidently well acquainted with the region, and from his own notes and surveys has succeeded in producing a map which gives fresh detailed information concerning the courses of these important rivers, basing it upon astronomical observations and surveys of other explorers, especially those of Commandant Rouvier. The map ought to prove of service to future travellers, and shows the speed of the current, position of rocks, depth of water, sandbanks at mean low water, and in addition, indicates the track that can safely be followed up the rivers during the night. In many particulars the map differs from those previously published, and as regards the lower Congo, from that showing the surveys of Rev. G. Grenfell, which has been presented to this Society. The latitude and longitude of some of the important places are entirely different from those shown on the latter map; but, as M. Chastrey does not appear to have taken any astronomical observations himself, his map, although useful for detail, cannot be considered as authoritative on such matters. Owing to erosion, considerable alteration is continually taking place in the sandbanks and channels of the rivers, and the author has therefore arranged to make use of all fresh information as he receives it, and keep his map up to date. The map has been heliographed, and is in appearance a somewhat rough production. Three hundred copies only have at present been printed.

AMERICA.

British Columbia. **Lands and Works Department, Victoria, B.C.**

Map of the Yale District, and portions of adjacent districts of British Columbia. Scale 1: 500,000 or 7·8 stat. miles to an inch. Lands and Works Department, Victoria, B.C., 1900. *Presented by H. G. Slade, Esq.*

No hill work is given on this map. It, however, shows very clearly lakes, rivers, and creeks in blue; railways and roads in black; and boundaries with the names of the divisions in red. Land-blocks are also indicated and numbered, and altogether the map will be very useful for general reference.

Mexico. **Bureau of the American Republics.**

Maps of Mexico showing Minerals and Agriculture. Scale 1: 3,168,000 or 50 stat. miles to an inch. Prepared in the Bureau of the American Republics, W. W. Rockhill, Director, Washington, D.C., 1900. 2 *Maps. Presented by the Bureau of the American Republics.*

These are two maps of Mexico on the same scale, one showing, in addition to the ordinary topographical features, the location of minerals by red letters, the extent to which the rivers are navigable, railways and telegraphs; whilst the other shows the orographical features by six different colours, indicating elevations from sea-level to 3000 metres. Superimposed upon these colours are eleven symbols showing the various agricultural products of the county. The maps are rather rough productions, and the latter one is, in parts, somewhat confused. The different colours used to represent the elevations of the land are not very satisfactory, and the result and general effect would doubtless have been better if different tints of one colour had been employed for the purpose.

GENERAL

Ancient Geography. **Kiepert.**

Formæ Orbis Antiqui. 36 Karten im Format von 52: 64 cm. mit kritischem Text und Quellenangabe zu jeder Karte. No. xix. Italia Inferior cum Insulis. Mit 5 Seiten Text. Ergänzt und herausgegeben von Richard Kiepert. Berlin: D. Reimer (Ernst Vohsen), 1901. *Price* 3 *marks.*

The late Dr. Richard Kiepert had during the lifetime of his father, Dr. Heinrich Kiepert, planned the publication of the present edition of this atlas, and in the year 1894, there appeared the first part, containing six maps. Since that date the work has been unavoidably suspended owing to the illness and lamented death of Dr. Richard Kiepert, and to the difficulty of finding a suitable person to take his place. The atlas

will now be issued in single sheets, with text, which latter will for the future be in German only. In consequence of the cost of production, the price of each sheet has been raised to three marks, which sum will now also be charged for each of the six sheets that were published in the first part of the work in 1894.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, March and April, 1901. *Presented by the Hydrographic Department, Admiralty.*

No.	Inches.	
1451 m	= 2·5	Scotland, east coast:—Inverness firth and Beauly basin. 2*s.* 6*d.*
243 m	= 4·0	Egypt, north coast:—Port of Alexandria. 2*s.* 6*d.*
3170 to 3176	d = 1·6	Antarctic ocean. 7 sheets. 2*s.* 6*d.* each sheet.
3201 m	= 5·0	Iceland:—Reykjavik harbour. 1*s.* 6*d.*
3144 m	= 1·0	Newfoundland:—White bay (southern portion). 1*s.* 6*d.*
3014 m	= 0·8	Lake Huron:—Great Duck island to Détour passage. 2*s.* 6*d.*
1791 m	= 0·8	Lake Huron:—Cove island to Great Duck island. 2*s.* 6*d.*
605 m	= 0·5	Mosquito coast:—Blewfield bluff to Man-of-War cays. 2*s.* 6*d.*
573 m	= 12·0	British Columbia:—Nanaimo harbour. 2*s.*
1915 m	= var.	Anchorages in Alaska:—Mist harbour, Lazy bay, Sandy cove, Albatross anchorage, Isanotski strait. 1*s.* 6*d.*
638 m	= 1·0 / 4·0	Africa, west coast:—River Congo and adjacent creeks, Banana creek. 2*s.* 6*d.*
2991 m	= 3·0	Africa, west coast:—River Congo, Kissanga to Camoens point. 2*s.* 6*d.*
1003 m	= 2·0 / 0·85	Africa, east coast:—Beira harbour, Pungue river. 2*s.*
2871 m	= 2·9	Madagascar:—Nosi Bé, southern anchorages. 2*s.* 6*d.*
900 m	= 0·5	Celebes, east coast:—Tilamuta harbour to Tanjong Tuladenggi. 2*s.* 6*d.*
2292 m	= 2·0	China, east coast:—Sam sa inlet (southern portion). 2*s.* 6*d.*
1395 m	= 3·9	China, east coast:—Tinghai and approaches. 1*s.* 6*d.*
1679		Harbours and anchorages in the archipelago:—New plan, Deuthero cove.
2208		Dniestr estuary:—Plan added, Tsarigrad mouth.
2221		Ports on the north shore of the Black sea:—Plans added, Sochi road, Khosta road.
289		Newfoundland:—New plan, Petit-pas cove.
2194		Anchorages in the northern part of Celebes:—New plan, Amurang bay.
2975		Anchorages in the west coast of Yezo island:—New plan, Iwanai anchorage.
656		Solomon islands:—Plan added, Bambataui.
986		Vanikoro islands:—Plan added, Basilisk harbour.

(*J. D. Potter, Agent.*)

Charts Cancelled.

No.		Cancelled by	No.
3014.	St. Mary's Pool.		
1451.	Firth of Inverness.	New plan. Inverness Firth	1451
243.	Port of Alexandria.	New plan. Port of Alexandria	243
573.	Nanaimo harbour.	New plan. Nanaimo harbour	573
1915.	Anchorages in Alaska.	New sheet. Anchorages in Alaska	1915
638.	River Congo and adjacent creeks.	New plan. River Congo and adjacent creeks	638
1003.	Pungue river.	New sheet. Beira harbour, Pungue river	1003
706.	Plan of Nosi Bé, southern anchorage on this sheet.	New plan. Nosi Bé, southern anchorages	2871
2194.	Plan of Dondo point to Cape Besar on this sheet.		

No.		Cancelled by	No
1395.	Ting-hai harbour.	New plan. Ting-hai and approaches	1395
17.	Plan of Basilisk harbour on this chart.	New plan. Basilisk harbour	986

Charts that have received Important Corrections.

No. 2006, Scotland, west coast :—River Clyde from Greenock to Dumbarton. 2495, Ireland :—Kenmare river. 2297, Gulf of Bothnia :—Hango head to South Quarken. 1130, Sardinia :—Cagliari bay. 2774, Adriatic :—Grossa island to Zirona channel 2712, Adriatic :—Zirona channel to Curzola. 1238, South Shetland and South Orkney islands. 284, Newfoundland :—Cowhead harbour to Ste. Genevieve bay. 2864, United States, east coast :—Beaufort harbour. 478, Puerto Rico :—Port San Juan, 546, Brazil :—Espiritu Santo bay. 585, British Columbia :—Harbours in the strait of Georgia. 7, Arabia :—Aden and adjacent bays. 745, India, west coast :—Alvagudda to Mulki. 1009, Malacca strait :—Approaches to Perak river. 775, Cochin China :—Approaches to Haifong. 1169, Cochin China :—Approaches to port Courbet. 2376, Harbours in Formosa. 1115, China, Yang tse kiang :—Yo chau fu to Kwei chau fu. 1256, China :—Gulfs of Pe chili and Liau tung. 2357, China :—Ching Wang Tao road. 104, Korean archipelago, southern portion. 2815, Japan :—Nagasaki harbour. 806, Japan :—Sendai bay to Miyako bay. 93, Japan :—Akashi-no-Seto and approaches. 511, Manchuria :—Trinity bay to the Eastern Bosporus. 624, Victoria :—Hobson bay. 214, Solomon islands. 2392, Solomon islands :—New Georgia, Vella Lavella to Wana Wana. 261, Solomon islands :—New Georgia, Wana Wana to Mbul ı island. 2873, Anchorages in the Solomon islands. 1469, Solomon islands :—Guadalcanar and Florida islands.

(*J. D. Potter, Agent.*)

North Atlantic Ocean and Mediterranean Sea. **Meteorological Office, London.**

Monthly Pilot Chart of the North Atlantic Ocean and Mediterranean Sea for June, 1901. Meteorological Office, London. *Price* 6*d*. *Presented by the Meteorological Office.*

Norwegian Charts. **Norges Geografiske Opmaaling.**

Specialkart over den Norske Kyst fra Smölen til Ramsöfjord og Hitteren, 1 : 50,000, 1898.—Specialkart over den Norske Kyst. Ranfjorden, 1 : 50,000, 1900.—Specialkart over den Norske Kyst. Namsenfjord, 1 : 40,000, 1900. — Norges Geografiske Opmaaling, Kristiania. *Presented by the Norges Geografiske Opmaaling.*

United States Charts. **United States Hydrographic Office.**

Pilot Charts of the North Pacific Ocean for May, and North Pacific Ocean for June, 1901. U.S. Hydrographic Office, Washington, D.C. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

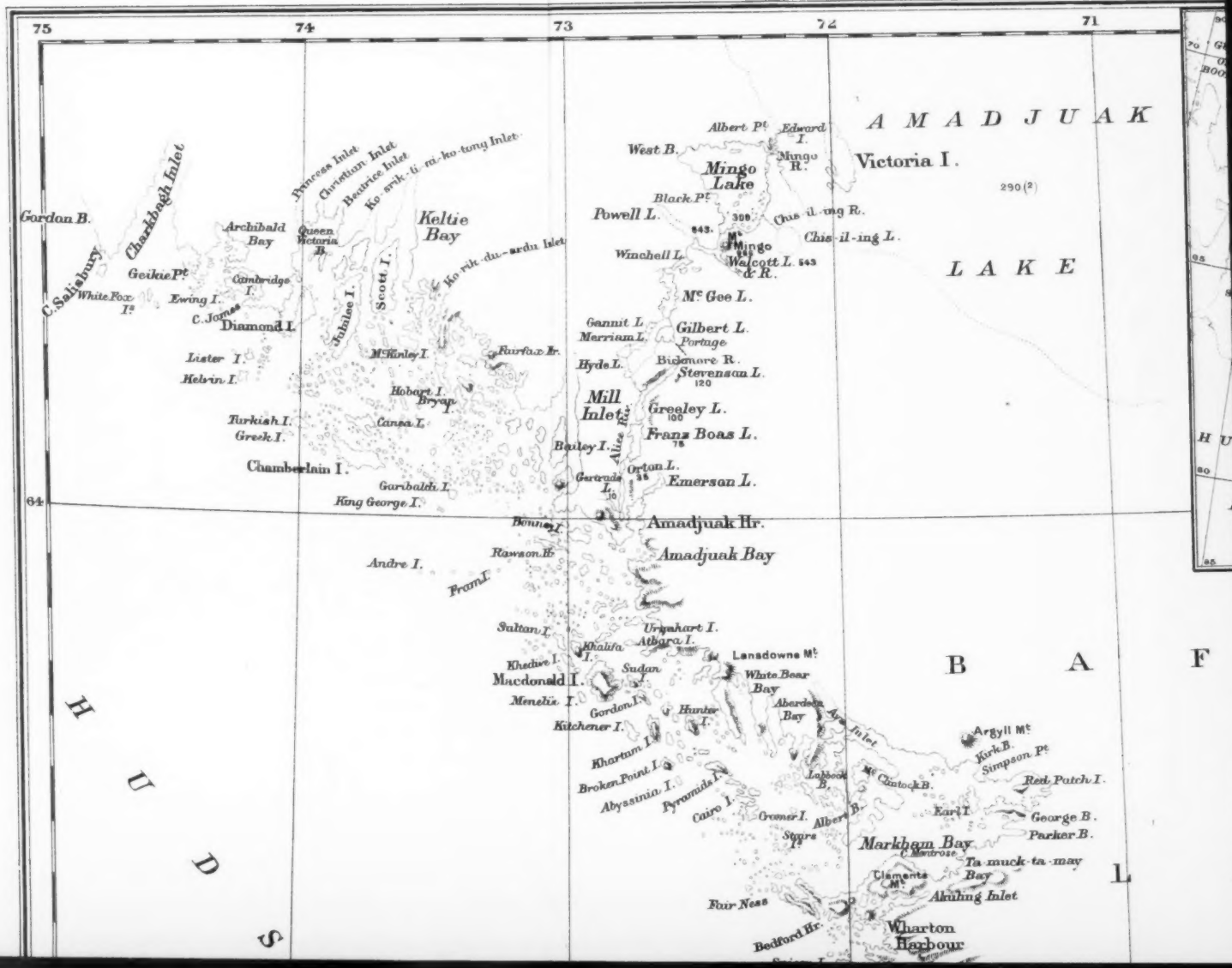
Egypt. **Seton-Karr.**

Twenty-four photographs taken in Omdurman, two of the Atbara, and one taken in Fayum, by H. W. Seton-Karr, Esq., 1899. *Presented by H. W. Seton-Karr, Esq.*

Although not very good specimens of photography, some of the subjects are interesting, as will be seen by the titles.

Omdurman.—(1) Street arab; (2) Dervish Jesuits; (3) Officers, 9th Sudanese; (4) Orphan boy; (5) Inspection of kit; (6) Horse of *Times* correspondent; (6) Bugler boy, 9th Sudanese; (8) Officers, 9th Sudanese, and gazelles; (9) The Khalifa's house as it appeared after the battle of Omdurman; (10) The Nile; (11) Soldiers' quarters; (12) A guard; (13) Monument to Herbert Howard; (14) Officers of 9th Sudanese and gazelle; (15) Messrs. Seton-Karr and Nathan; (16) Mr. Seton-Karr; (17) Officers' quarters; (18, 19) Street arabs; (20) Mr. Seton-Karr at gate of Mahdi's tomb; (21) Mr. Seton-Karr on the ruins of the Mahdi's tomb; (22) Egyptian soldiers, Omdurman; (23) Mr. Seton-Karr and horse of *Times* correspondent (Mr. Humphrey Ward) ——; (24) Fishing on the Atbara; (25) Camp on the Atbara; (26) Camp in Fayum.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.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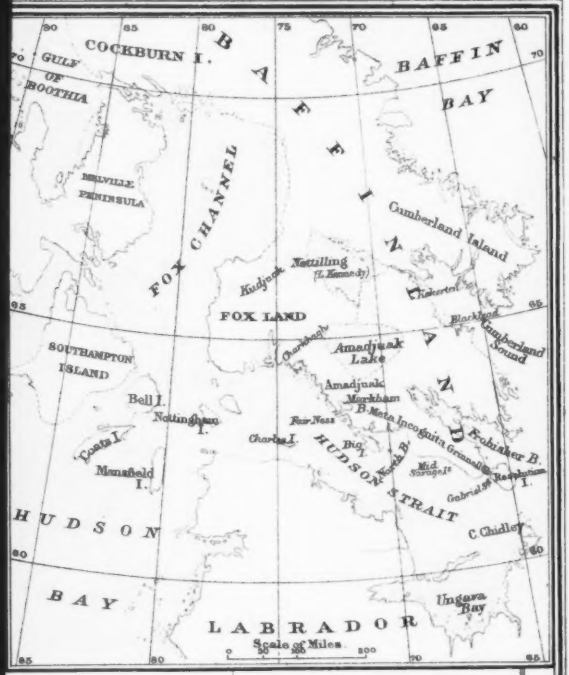
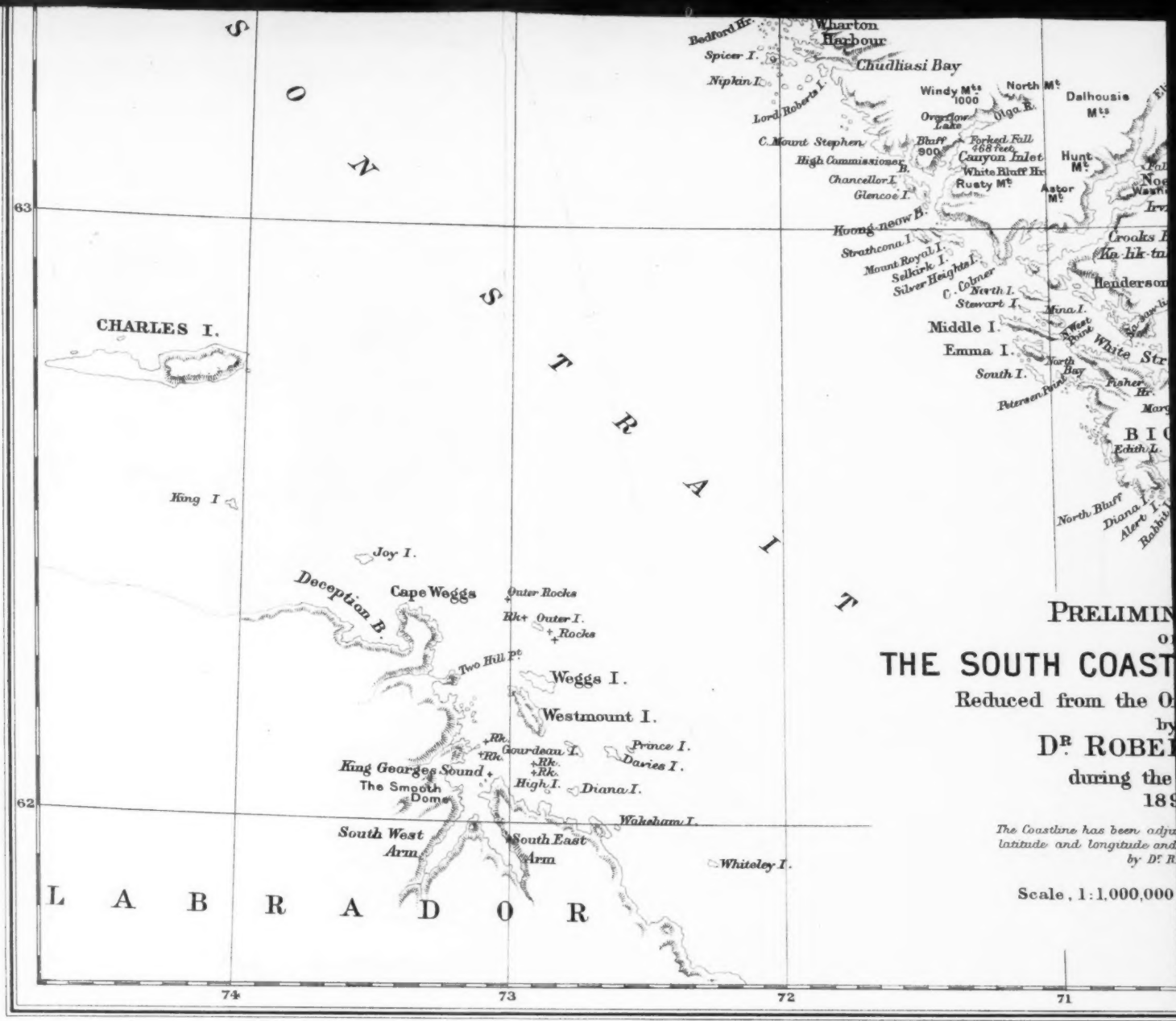
A M A D J U A K
L A K E
B A F
H U D S
Albert Pt
Edward I.
West B.
Mingo R.
Victoria I.
Mingo Lake
Black Pt
Powell L.
Chas il-ing R.
Chis-il-ing L.
Winchell L.
Mingo
Walcott L.
& R.
Mc Gee L.
Gannit L.
Merriam L.
Gilbert L.
Portage
Hyde L.
Dickmore R.
Stevenson L.
Mill Inlet
Greeley L.
Franz Boas L.
Bailey I.
Alice R.
Orton L.
Garrade L.
Emerson L.
Amadjuak Hr.
Amadjuak Bay
Bonney I.
Rawson Hr.
Andre I.
Fram I.
Sultan I.
Urquhart I.
Khalifa I.
Athara I.
Lansdowne Mt
Khedive I.
Sudan
White Bear Bay
Macdonald I.
Menelik I.
Gordon I.
Hunter I.
Aberdeen Bay
Kitchener I.
Argyll Mt
Kirk B.
Simpson Pt
Khartum I.
Broken Point I.
Abyssinia I.
Pyramids I.
Cairo I.
Labouchere B.
Mc Clintock B.
Red Patch I.
Earl I.
George B.
Parker B.
Markham Bay
C. Montrose
Ta-muck-ta-may Bay
Clements Mt
Akuling Inlet
Four Ness
Bedford Hr.
Wharton Harbour
Gordon B.
Charbbagh Inlet
Princess Inlet
Christian Inlet
Beatrice Inlet
Ko-srik-li-ni-ko-tung Inlet
Keltie Bay
Archibald Bay
Queen Victoria B.
Scott I.
Jubilee I.
Ko-rik-du-ardu Inlet
C. Salisbury
Geikie Pt
White Fox Is
Cambridge I.
Ewing I.
C. James
Diamond I.
Lister I.
Helvin I.
McKinley I.
Fairfax Hr.
Hobart I.
Bryan
Turkish I.
Greek I.
Canea I.
Chamberlain I.
Garibaldi I.
King George I.



F F I N

A N D

Brook



Published by the Royal Geographical Society.

LIMINARY MAP
OF
OAST OF BAFFINLAND
the Original Track Survey,
by
OBERT BELL
ing the season of
1897.

been adjusted to observations for
ngitude and variations of the Compass.
by Dr R. Bell.

,000,000 or 15·78 = 1 Inch.

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F. S. Waller, F.R.G.S., *lith.*